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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VII) (Old)

Examination, November - 2017

EARTHQUAKE ENGINEERING

Sub. Code: 47903

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :

1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data whenever necessary.**
4) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION-I

Q1) a) What are causes of earthquake? Explain in brief plate tectonic theory. **[8]**

b) Classify and describe with suitable sketches, different types of seismic waves generated by an earthquake. **[8]**

Q2) a) Define Logarithmic decrement, how it is measured and derive the equation of Logarithmic decrement. **[7]**

b) The building frame shown in the Fig.1 is given a 100 mm lateral displacement and released from the rest to vibrate freely. Find the logrithmatic decrement and displacement of the system afte 12 cycles and comments on the result. Consider 10% damping. Take $EI_{column} = 1.1 \times 10^{12}$Nmm. **[9]**

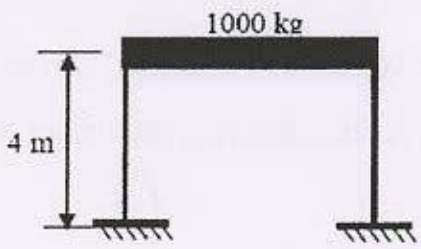


Fig. 1

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Q3) a) Explain in details Force Transmission Ratio. **[05]**

b) A SDOF system consists fo 5 m high column of 600 mm diameter which supports the heavy mass of 10500 kg at its top. The system is subjected to a harmonic force of 1800 sin50t N. Consider 20% damping and E = 2×10^5. Calculate the maximum dynamic amplitude and also state whether the system will have resonance or not? **[11]**

Q4) Calculate the base shear for a five storey hospital building having special moment resisting frame (SMRF) located in Pune on medium soil with following data using seismic coefficient method. **[18]**

a) No. of bay in x and y-direction = 4

b) Width of each bay = 5m

c) Thickness of slab = 150 mm

d) Storey height = 3.2 m

e) Size of beam and column = 300 mm × 450 mm

f) Amount of damping = 5% of critical damping

g) Live load = 4kN/m^2

Assume any additional data if required and neglect the weight of the infill wall panels.

SECTION-II

Q5) a) Explain earthquake design philosophy for building. **[8]**

b) Explain soft storey? Explain how soft storey probelms can be eliminated in the existing buildings. **[8]**

Q6) a) Explain how "ductility of building" can be effectively designed. **[8]**

b) What are the ductile detailing provisions for column? Explain with neat sketches. **[8]**

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Q7) a) What points should be kept in mind while designing earthquake resistant brick masonry structure? **[8]**

b) Discuss in detail the advantage of horizontal bands and vertical reinforcement in the masonry buildings. **[8]**

Q8) Write a short note (Any three): **[18]**

a) Stud Wall Construction.

b) Strong column and weak beam.

c) Effect of soft storey of RC structure.

d) Jacketing of column.

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Seat No.	

Total No. of Pages : 2

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

SOLID WASTE MANAGEMENT (Elective-I)

Sub. Code : 67569

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any two of the following: **[2×8=16]**

a) What is Solid Waste and Solid Waste Management? Write the objectives of SWM.

b) State the composition of MSW. Describe the compositions.

c) Write note on Biomedical Waste Management.

Q2) Answer any two of the following: **[2×9=18]**

a) Explain with the help of flow diagram, the functional elements of Municipal Solid Waste Management.

b) Explain the methods of solid waste collection with a neat sketch.

c) Explain in detail with help of figure the different types of Transfer Station.

Q3) Answer any two of the following: **[2×8=16]**

a) List out the different equipment used for processing solid waste and explain any one with neat sketch.

b) What is MRF? Explain the processes for MSW at these facilities with flow diagram.

c) Explain with the figure the different types of air classifiers methods.

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SECTION-II

Q4) Answer any two of the following: **[2×9=18]**

a) What is Sanitary landfilling? Write the site selection criteria for sanitary landfilling.

b) Draw the cross section of sanitary landfill and explain the essential components.

c) Identify the adverse effects of a landfill leachate and its appropriate control measures.

Q5) Answer any two of the following: **[2×8=16]**

a) What is composting? Explain composting process of bio degradable MSW.

b) Explain mechanical composting plant with flow diagram.

c) Explain the different factors affecting composting.

Q6) Answer any two of the following: **[2×8=16]**

a) Explain the working of an incinerator with a neat sketch.

b) Write the air pollution problem associated with incineration system and its control techniques.

c) Describe pyrolysis and its products.

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Total No. of Pages : 2

Seat No.	

B.E. (Civil) (Semester-VII) Examination, November - 2017
GROUND IMPROVEMENT TECHNIQUES (Elective-I)
Sub. Code : 67571

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Que. No. 1 from section-I and Que. No. 5 from section-II are compulsory.**
2) **Solve any two other questions from each of the section.**
3) **Figures to the right indicates full marks.**

SECTION-I

Q1) Answer the following: **[4×5=20]**

a) Explain the various types of vertical drains used in ground improvement.

b) What is mean by dynamic consolidation.

c) Explain use of stone column as ground improvement method.

d) Enlist various ground improvement technique according to their suitability.

Q2) a) How do vertical drains improve the functioning of pre-loading? Explain with neat sketch. **[8]**

b) Explain various components of ground Anchor. **[7]**

Q3) a) Explain design procedure of stone column. **[8]**

b) Explain construction sequence of soil nailing. **[7]**

Q4) Write a short note on **[3×5]**

a) Classification of ground improvement technique

b) Soil nailing

c) Rock Anchor in grannuar soil

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SECTION-II

Q5) Answer the following: **[4×5=20]**

a) Enlist various factor affecting the soil stabilization.

b) Explain the earth reinforcement mechanism.

c) Write down the various application of earth reinforcement.

d) Enlist different types of geosynthetics.

Q6) a) Compare and enlist the various method of soil stabilization. **[8]**

b) Explain the various application of geosynthetics with respect to

i) reinforcement ii) separator

iii) filter iv) drainage **[7]**

Q7) a) Explain the stress-strain relationship of reinforced soil. **[8]**

b) Explain the various types of grout used in ground improvement. **[7]**

Q8) Write a short note on: **[5×3]**

a) Function of geosynthetics

b) Fly-ash soil stabilization

c) Selection of geosynthetics



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Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Part - IV) (Semester - VIII)
Examination, November - 2017
DESIGN OF CONCRETE STRUCTURES - II
Sub. Code : 67748

Day and Date : Wednesday, 1 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary and mention it clearly.**
4) **Use of non programmable calculator is allowed.**
5) **Use of relevant IS Codes are allowed.**

SECTION - I

Q1) Design rectangular beam for limit state of collapse in torsion for following data. **[16]**

Size of beam = 400 × 700mm, over all

Factored Shear force = 95 KN

Factored Bending moment = 180 KN.m

Factored Torsion Moment = 55 KN.m

Effective cover = 50mm

Use M20 and Fe 415

Q2) A RCC beam ABCD spanning over four supports carries a live load of 12KN/m and dead load from walls 300mm, 2.8 high. If M20 grade concrete and Fe 415 grade steel is to be used. Design the continuous beam using IS-456 - 2000 provision. Span AB = BC = CD = 6m Take unit weight brick wall 19KN/m^3. Draw a sketch showing reinforcement details. **[16]**

Q3) Design a square water tank resting on ground having dimensions 4m × 4m and height of water is 3m. Assume free board of 0.2m. Use M20 and Fe 415 grades. **[16]**

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Q4) a) Write a note on balanced, under reinforced and over reinforced section as per WSM. **[9]**

b) Explain the concept of moment of redistribution. **[9]**

SECTION - II

Q5) a) Explain in details three concepts of pre-stress concrete section in analysis. **[8]**

b) Explain systems of pre-stressing with figures. **[8]**

Q6) A pre-stressed concrete beam of rectangular section 300mm × 600mm has a span of 10m. The effective pre-stressing force is 980KN at constant eccentricity of 120mm. The dead load of beam is 4.5KN/m and the beam has to carry a live load of 7.5KN/m **[16]**

Determine the extreme stresses,

a) At the end section

b) At the midsection without action of live load

c) At mid section with action of live load.

Q7) A post tensioned pre-stressed concrete beam of 16m span is subjected to an initial pre-stress of 1458KN. The profile of the cable is parabolic with the maximum eccentricity of 520mm at the center of span. **[16]**

$A = 2.42 \times 10^5 mm^2$, $I = 5.30 \times 10^{10} mm^4$, $As = 1386 mm^2$,

$Es = 2.1 \times 10^5 N/mm^2$, $Ec = 3.82 \times 10^4 N/mm^2$

$\mu = 0.25$, $k = 0.0015/m$, anchorage slip = 2.5mm, creep coefficient = 1.5, $\alpha = 0.13$

Determine the following losses in pre-stress,

a) Elastic shortening.

b) Shrinkage in concrete.

c) Creep in concrete.

d) Slip in anchorage.

e) Frictional loss.

Q8) Design a pre-tensioned concrete rectangular section for the following details

Effective span of beam = 12m.

Live load of intensity = 30 KN/m.

Concrete grade = M 35

Ultimate stresses tendon = 1450 N/mm^2

Loss of pre-stress = 20%

Assume Safe stress is 0.6 times Ultimate stress in tendon.

Permissible stress in concrete at transfer stage is 0.5 σ_{CK}

Permissible stress in concrete at working stage is 0.4 σ_{CK}

Permissible tensile stress in concrete at transfer and working stage is 1.2 N/mm^2 **[18]**

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VIII)
Examination, November - 2017
STRUCTURAL DESIGN OF FOUNDATION AND RETAINING STRUCTURES (Elective - II)
Sub. Code: 67753

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any two questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Use of IS 456- 2000 is allowed.**
4) **Assume suitable data if necessary and mention it clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Two columns A and B 5 m apart between centres carry loads 840 kN and 1200 kN. Design a 2 m wide combined rectangular footing for the columns. The footing shall consist of a central longitudinal beam with cantilevering slabs on either side. Each column is 400 mm × 400mm. The safe bearing capacity of soil is 150 kN/m^2. Use M 20 grade concrete and Fe 415 steel.**[25]**

Q2) A column carrying a load of 2500 kN has to be supported on 4 piles each of size 300 mm × 300 mm. The piles are spaced at 1.00 m centres as shown in figure.1. The column size is 600 mm × 600 mm. Design the pile cap. Use M 20 grade concrete and Fe 415 steel. **[25]**

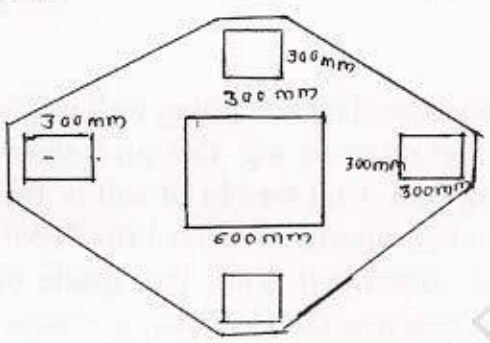


Fig. 1

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Q3) Design a suitable continuous raft foundation connecting the columns of a building 12 m × 12 m shown in figure to suit the following data. **[25]**

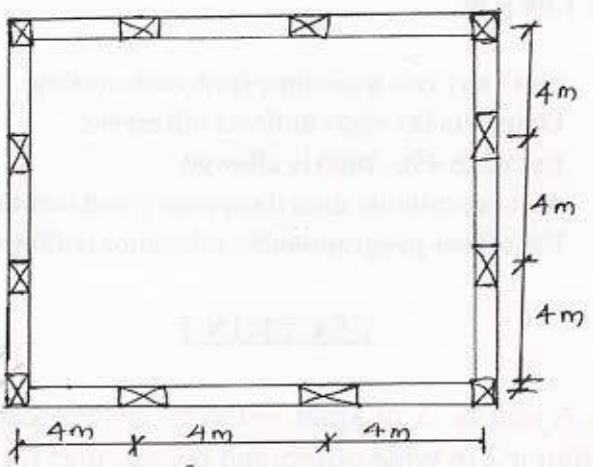
a) Spacing of column = 4 m C/C

b) Service load transmitted = 500 kN on each column.

c) Size of column = 300 mm × 300 mm.

d) Safe bearing capacity = 150 kN/m^2.

e) M 20 concrete and Fe 415 steel.



figure

SECTION-II

Q4) a) Draw neat sketch of well foundation and explain function of each component part in detail. **[12]**

b) Enlist different types of well foundation explain each in detail wiht neat sketch. **[13]**

Q5) A steam of cantilever retaining wall is 3.8m tall, The cantilever retaining wall retains soil up to its top. Design a steam, toe and heel slab of a cantilever retaining wall. Unit weight of soil is 19KN/M^3. The angle of repose is 30°. Safe bearing capacity of soil is 180KN/M^2. The coefficient of friction between soil and concrete is 0.60. Use grade of concrete M_{20} and grade of steel Fe 415. Draw neat sketch showing reinforcement details of cantilever retaining wall. **[25]**

Q6) a) Explain breakwater and its application? Draw a neat sketch and explain vertical wall break water. **[12]**

b) Design armor of rubble mound breakwater if depth of water is 17.0m. Wind velocity is 165Km/Hour. Fetch of wave is 260KM. Allowable bearing pressure on rock is 800KN/M^2. **[13]**

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b) Differentiate between free hold property and lease hold property. [5]

c) Write the significance of sinking fund and derive its expression. [5]

Q8) Write short note on (any three): [18]

a) Building lease and occupational lease.

b) Valuer and his duties.

c) Different types of values.

d) Arbitration.

EEE

Total No. of Pages :4

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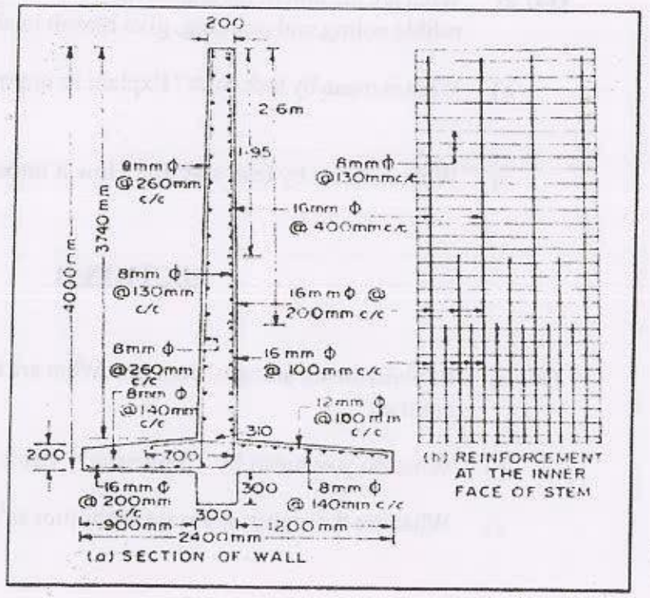
B.E. (Civil) (Semester - VII) (New Course)
Examination, November - 2017
QUANTITY SURVEYING & VALUATION
Sub. Code: 67560

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**
Time :2.30 p.m. to 6.30 p.m.

Instructions :
1) **Q.No. 1 is compulsory.**
2) **Attempt any two questions from remaining questions of section I.**
3) **Attempt any three questions from section II.**
4) **Assume any other additional data if required and state it clearly.**

SECTION-I

Q1) Work out the quantities of below retaining wall 50m in length as stated. **[20]**



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a) Calculate concrete quantity in standard format.

b) Prepare a BBS of given figure in standard format.

Q2) a) Write different types of estimate and state various items to be included in it. **[5]**

b) What is DSR? Prepare analysis of rate for a RCC isolated box footing of area 2.5Ssq.M, and 3.1Sq.M each for a concrete depth 350mm. **[10]**

Q3) a) Which are the various extra charges taken in to account for preparing detailed estimate and why? Explain in detail. **[8]**

b) Write unit of measurement of any three civil engineering items. Write mode of measurement for excavation and concrete. **[7]**

Q4) a) What are the unit of measurement for skirting, door handle, steel sections, rubble soling and pointing, give reason in short. **[5]**

b) What is mean by task work? Explain its importance with suitable example. **[5]**

c) What is mean by lead and lift? How it impacts the cost? **[5]**

SECTION-II

Q5) a) Explain the meaning of contract. What are the reasons of for rejection of contract? **[7]**

b) What do you mean by "Tendering"? Draft a sample tender notice. **[5]**

c) What are the rights and responsibilities of parties of contract. **[5]**

Q6) a) Explain valuation by development method. **[6]**

b) A plot shown in figure is to be valued according to the following details: **[10]**

i) Front width is 50m

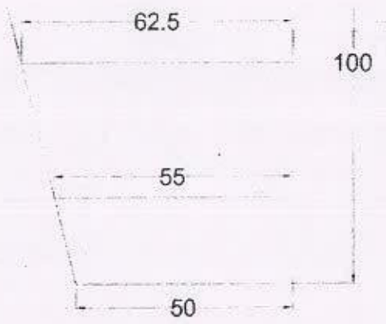
ii) Rear width is 75m

iii) Initial depth is 20m

iv) Market rate of land in the same locality is Rs. 375psm.

Use belting method of valuation.

75



Q7) a) A plate compactor was purchased at Rs. 80,000/-. Assume salvage value to be 10% after 8 years, Calculate depreciation for every year by following methods: **[6]**

i) Straight line method

ii) Constant percentage method.

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Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

PROJECT MANAGEMENT AND CONSTRUCTION EQUIPMENT

Sub. Code : 67561

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt any THREE questions from each Section.**
2) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain the role of various agencies involved in a construction project. **[8]**

b) A project consists of following activities with their duration in days. **[9]**

Activity	1-2	1-3	1-4	2-5	3-6	4-5	4-6	4-7	5-7	6-7
Duration (days)	6	3	4	0	4	12	10	8	5	6

Draw the network. Find out critical path and project duration.

Following conditions exists at the end of 10^{th} day,

i) Activities 1-2, 1-3, 1-4 have been completed as per schedule.

ii) Activities 4-5, 4-6, 3-6 are in progress and will require 6,6 and 1 more days for its completion, respectively.

iii) Other activities have not been started and their duration holds good except activity 5-7 which will require only 3 days instead of 5 days as planned originally.

Update the network.

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)2) a) Explain the concept of Normal and Beta Distribution in P.E.R.T. [8]

b) With the information given in the table draw the network for a construction project. Determine the critical path and its standard deviation. Find Probability of completion of project in 40 days. (For Z = 1.7, Pr. = 95.54%; For Z = 1.8, Pr. = 96.41%) [9]

Activity	Optimistic time	Most likely time	Pessimistic time
1-2	2	5	8
2-3	8	11	20
3-4	0	0	0
2-4	4	7	16
2-5	4	9	20
4-6	7	10	13
5-6	3	7	17
3-7	3	5	13
6-7	2	3	10
7-8	2	4	6

)3) a) Explain various safety equipment used on construction sites. [8]

b) What are the common risks on construction projects? How will you identify these risks? [9]

)4) Write notes on any FOUR. [16]

a) Objectives of Project Management.

b) Milestone Chart.

c) Resource Allocation.

d) Safety Policy.

e) Safety Training.

SECTION-II

)5) a) Explain the construction and operation of Bulldozer with neat sketch. [8]

b) Explain working of Scraper with neat sketch. [8]

)6) a) Explain the construction and working of 'Clamshell'. [8]

b) Enlist various types of compacting equipment. Explain any ONE with sketch. [9]

)7) a) Explain the 'safety measures' in blasting operations. [8]

b) Explain in detail 'Well Point System' of dewatering with neat sketches. [9]

)8) Write notes on any FOUR. [16]

a) Mechanical v/s Manual Construction.

b) Use of Tractors in construction.

c) Tippers.

d) Detonators.

e) Necessity of drainage in excavations.

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Total No. of Pages : 3

Seat No.	

B.E. (Civil Engineering) (Semester - VII)
Examination, November - 2017
EARTHQUAKE ENGINEERING (New)
Sub. Code : 67559

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Assume any suitable data whenever necessary.**
3) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION - I

Q1) a) What is mean by plate boundaries? Explain in details. **[8]**

b) Classify ad describe with suitable sketches, different types of waves generated by an earthquake? **[8]**

Q2) a) Derive the equation of motion and its solution for free damped vibration system. **[8]**

b) Find the natural frequency and natural period for the building frame shown in the fig. 1. During test the frame is given 40 mm initial lateral displacement and released from the rest to vibrate freely. Find the displacement after 4 seconds and number of cycles when amplitude reduced to 1/20 of maximum.Consider 10% damping. Take $EI_{Column} = 1.5 \times 10^{12}$ N.mm^2, $EI_{Beam} = \infty$. **[10]**

OR

b) A SDOF system consists of 5 m high column of 450 mm diameter which supports the heavy mass of 20 tonne at its top. The system is subjected to a harmonic force of 200 Sin 40t kN. Consider 20% damping & $E = 2.1 \times 10^5$ N/mm^2. Calculate the maximum dynamic amplitude. Also, state whether system will have resonance or not? **[10]**

P.T.O.

Q3) Calculate base shear in the critical direction only for BSNL office in Pune with following data by seismic coefficient method. **[16]**

a) No. of storey = 4

b) No. of bay in x direction = 3

c) No. of bay in y direction = 1

d) storey height = 3 m

e) Width of each bay = 5 m

f) Total DL on roof = 12 kN/m^2

g) Total DL on floor = 10 kN/m^2

h) LL = 4 kN/m^2,

i) Thickness of slab = 120 mm

All columns having their longer side in X direction. Neglect weight of infill walls. Assume suitable data if required. Write all your assumptions & clauses of IS 1893 (2002). Building is provided with additional viscous dampers which will increase damping by 10%.

SECTION - II

Q4) a) Explain ductile detailing of beam as per IS 13920: 1993. Also give limitation of this code. **[10]**

b) Explain four virtue of good earthquake resistant design. **[8]**

OR

b) Explain soft storey & discuss its performance of soft storey building in past earthquakes. How will you avoid soft storey? **[8]**

Q5) a) Define the shear wall and its classification? Describe the structural behavior of shear wall? **[8]**

b) Draw the detailed sketch of **[8]**

i) Different ways of beam jacketing as IS code and.

ii) Different ways of columns as per IS code.

Q6) a) Explain in details concept of Friction Pendulum Bearings? **[8]**

b) Explain Tuned Liquid Dampers with its working principal? **[8]**

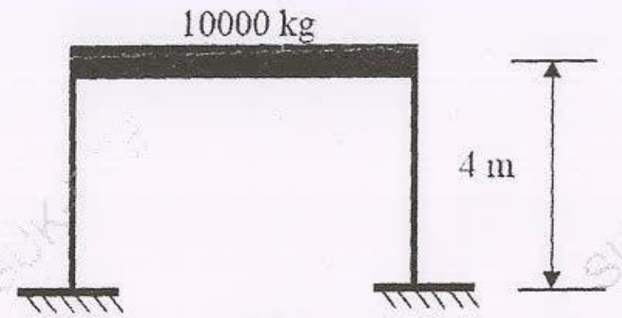


Fig 1.

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Total No. of Pages : 2

B.E. (F.E.) (All Branchs) (Semester - I & II) Examination, November - 2017

BASIC MECHANICAL ENGINEERING

Sub. Code : 59186

Day and Date :Friday, 24 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions:
1) **Attempt any three questions from each section.**
2) **Figures to right indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

SECTION - I

Q1) a) Define thermodynamic state, thermodynamic process and thermodynamic cycle. **[6]**

b) Explain Kelvin Planck Statement and Clausius statement of second law of thermodynamics. **[4]**

c) In centrifugal compressor the suction and delivery pressure are 100 Kpa and 550 Kpa respectively. The compressor draws 15 m^3/min of air which has specific volume of 0.77 m^3/Kg. At delivery point the specific volume is 0.20 m^3/Kg. The compressor is driven by a 40 Kw motor and during passage of air through the compressor the heat loss to the surroundings is 30 KJ/Kg of air. Neglecting changes in potential energy and kinetic energy calculate increase in internal energy per kg of air. **[6]**

Q2) a) What are similarities and dissimilarities between heat and work? **[6]**

b) What is statement of first law of thermodynamics and state its limitations. **[6]**

c) Steady flow process is applied to nozzle. Steam enters horizontally at a pressure of 10 bar. The pressure of steam at the exit of the nozzle is 1 bar. The internal energy of the steam decreases by 250 KJ/Kg and specific volume increase from 0.2 m^3/Kg to 1.7 m^3/Kg as the steam flows through the nozzle. Find the exit velocity of steam if its inlet velocity is 900 m/min. Heat transferred from nozzle is negligible. **[6]**

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P.T.O.

Q3) a) Compare two stroke and four stroke I.C. Engine. [8]

b) Derive an expression for air standard efficiency for Otto cycle. Explain that the efficiency of an air standard Otto cycle is a function of compression ratio only. [8]

Q4) a) Differentiate between Vapour compression refrigeration and Vapour absorption refrigeration. [4]

b) Define following terms : [4]

i) Dew point temperature

ii) Relative humidity

iii) Wet bulb temperature

iv) Dry bulb temperature

c) Explain with neat sketch Vapour absorption refrigeration system. [8]

SECTION - II

Q5) a) Explain with neat sketch construction and working of Geothermal power plant. [8]

b) Explain axial flow compressor with neat sketch. [8]

Q6) a) Two pulleys having diameter 2 m and 1.5 m are separated by a distance of 5 m. The initial tension in the belt is 3 KN. The coefficient of friction between the belt and pulley is 0.3. Calculate the power transmitted by open belt when a smaller pulley rotates at 200 r.p.m. Neglect centrifugal tension. [8]

b) Explain with neat sketch working of Photovoltaic cell. [8]

Q7) a) Explain manufacturing process. Define metal removing process. Explain any one. [8]

b) Enlist different metal joining processes. Explain brazing process. [8]

Q8) Write short note on : [18]

a) Solar collector

b) Centrifugal pump

c) Sand casting process

▽▽▽▽

SF - 5

Total No. of Pages :2

Seat No.	

F.E. (All Branches) (Part - I) (Semester - I & II) (Revised) Examination, November - 2017

FUNDAMENTALS OF ELECTRONICS AND COMPUTERS

Sub. Code: 59184

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to right indicate full marks.**

3) **Assume suitable data if necessary.**

SECTION - I

Q1) Solve any two : **[18]**

a) Explain HW rectifier with necessary waveforms.

b) What is flip-flop? Explain J-K flip-flop.

c) Write a short note on mobile handset with block diagram.

Q2) Solve any two : **[16]**

a) Explain how transistor operates in CB configuration? Explain with I/P and O/P characteristics.

b) What is De-multiplexer? Explain 1 :4De-mux with truth table

c) Explain washing machine with block diagram.

Q3) Solve any two : **[16]**

a) Explain fixed bias circuit for biasing of transistor. Derive expression for stability factor.

b) Mention names of logic families and explain any one in detail.

c) Explain in details thermistor transducer with an application.

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SECTION - II

Q4) Solve any two : **[18]**

a) What are different hardware component of a computer system. Explain any four of them.

b) What is operating system? Explain different types of OS.

c) Write short note on computer network.

Q5) Solve any two : **[16]**

a) List and explain different topologies of computer network.

b) Explain output devices of computer system.

c) Explain following UNIX/LINUX command with an example.

i) LS.

ii) CD.

iii) CAT.

iv) MKDIR.

v) PWD.

vi) CP.

Q6) Solve any two : **[16]**

a) Explain OSI model.

b) Explain in brief Assembler, interpreter and compiler.

c) Explain low level language and high level language in details.

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SF-1

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Part - II) (Semester - I & II) (New) Examination, November - 2017

ENGINEERING MATHEMATICS-II

Sub. Code : 59933

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) Solve any THREE from the following: (5 marks each). **[15]**

a) $(1+x^2)\frac{dy}{dx}+2xy-4x^2=0$

b) $\left[y\left(1+\frac{1}{x}\right)+\cos y\right]dx+[x+\log x-x\sin y]\,dy=0$

c) $(x^3y^2+xy)\,dx=dy$

d) $(x^2y-2xy^2)dx-(x^3-3x^2y)dy=0$

Q2) Attempt any THREE from the following: (5 marks each). **[15]**

a) Find orthogonal trajectories of the family of curves $x^2+y^2=2ax$, where a is parameter.

b) A 12 V battery is connected to a simple series circuit in which the inductance is $\frac{1}{2}$H and resistance is 10 Ω determine the current i if $i(0)=0$.

c) A body originally at 85° C cools to 65° C in 25 minutes the temperature of air being 40° C, what will be the temperature of the body after 40 minutes.

d) If the population of a country is doubles in 50 years, in how many years will it three times under the assumption that the rate of increase is proportional to the number of inhabitants?

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Q3) Attempt any FOUR from the following: (5 marks each). **[20]**

a) Using Euler's method find the approximate value of y when $x = 1.5$ given $\frac{dy}{dx} = \frac{y-x}{\sqrt{xy}}$ and $y(1) = 2$. Take $h = 0.1$

b) Use Euler's modified method to find the value of y satisfying the equation $\frac{dy}{dx} = -xy^2$ with $y(0) = 2$ for $x = 0.2$

c) Use Taylor's series to solve numerically $\frac{dy}{dx} = 3x + y^2$. Given that $y(0) = 1$ at $x = 0.1$.

d) Apply Runge-Kutta fourth order formula to solve the differential equation $\frac{dy}{dx} = \sqrt{\sin x + \cos y}$, $y(0) = 1$ at $x = 1.5$

e) Solve the following simultaneous differential equations by Runge-Kutta method fourth order $\frac{dy}{dx} = xz + 1, \frac{dz}{dx} = -xy$ for $x = 0.3$ given that $y = 0$, $z = 1$, when $x = 0$.

SECTION - II

Q4) Attempt any THREE from the following: (5 marks each). **[15]**

a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$.

b) Evaluate $\int_0^\infty \frac{x^4(1+x^5)}{(1+x)^{15}} dx$.

c) Prove that $\int_0^\infty \frac{e^{-\alpha x} \sin x}{x} dx = \cot^{-1}\alpha$ and hence deduce that $\int_0^\infty \frac{\sin x}{x} dx = \frac{\pi}{2}$.

d) Define Error function and hence prove that $erf(\infty) = 1$.

Q5) Attempt any THREE from the following: (5 marks each). **[15]**

a) Trace the Strophoid curve $y^2(a+x) = x^2(a-x)$ where $a > 0$.

b) Trace the Leminiscate curve $r^2 = a^2 \cos 2\theta$.

c) Find the length of the arc of $y^2 = 4x$ cut off by the line $3y = 8x$.

d) Show that the length of arc of that part of cardioide $r = a(1+\cos\theta)$ which lies on the side of the line $4r = 3a \sec\theta$ away from the pole is $4a$.

Q6) Attempt any FOUR from the following: (5 marks each). **[20]**

a) Evaluate $\int_1^2 dx \int_1^3 xy^2 dy$

b) Evaluate $\int_0^{\pi/2} \int_0^y \cos 2y \sqrt{1 - a^2 \sin^2 x}\, dx\, dy$

c) Change into polar co-ordinates and hence evaluate $\int_0^a \int_y^a \frac{x^2}{(x^2+y^2)^{3/2}} dx\, dy$.

d) Find by double integration the area lying between the cardioide $r = a(1+\cos\theta)$ and outside the circle $r = a$.

e) ABCD is a square plate of side a and o is the midpoint of AB. If the surface density is proportional to the square of the distance from o, show that the center of gravity of the plate is at a distance $\frac{7}{10}a$ from AB.

★ ★ ★

b) A 2000N block is in contact with level plane; coefficient of friction is 0.30, if the block is acted upon horizontal force 650 N. What time elapse before the block reaches a velocity of 10 m/s starting from rest? If 650 N force is then removed how much longer will the block continue to move solve by using impulse-momentum principle. **[12]**

Q6) a) Explain motion under gravity. **[3]**

b) Explain coefficient of restitution. **[3]**

c) A ball dropped from height of 2 m on a smooth floor. The height of the first bounce is 1.62m. Determine

i) coefficient of restitution and

ii) expected height of next bounce. **[10]**

Seat No. [ ]

F.E. (All Branches) (Semester - I & II) (New) Examination, November - 2017

APPLIED MECHANICS

Sub. Code: 59185

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All the questions are compulsory.**
2) **Figures to the right indicate maximum marks for the question.**
3) **Neat sketches should be drawn whenever necessary.**
4) **Use of Non-Programmable calculator is allowed.**
5) **Any missing data may be assumed suitably and clearly highlighted in the anwser sheet.**

SECTION-I

Q1) a) Explain:-

i) Resolution of forces

ii) Couple **[4]**

b) Find resultant for the force system shown in figure and locate it with respect to 'A' **[12]**

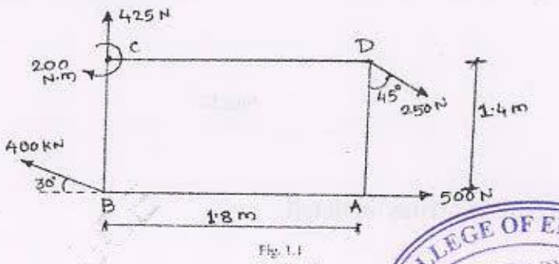


Fig. 1.1

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Q2) a) State and explain virtual work principle. [5]

b) The cylindrical rollers of weight 50 N each are placed inside a cup. Find the reactions at the point of contact. Refer fig. 2.1 [13]

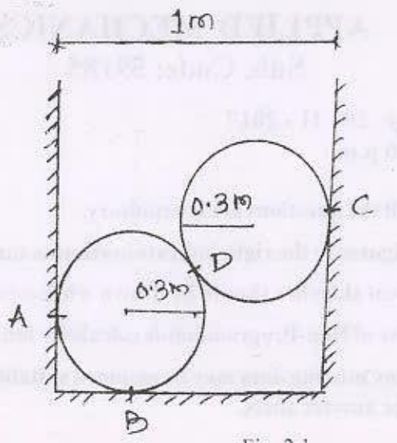


Fig. 2.1

OR

b) Determine the support reaction for the beam shown in fig. 2.2 by using Virtual work principle. [13]

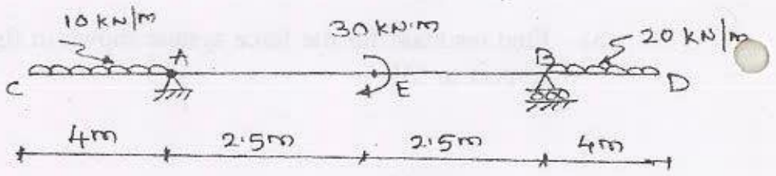


Fig. 2.2

Q3) a) Explain 'Truss' in detail. [4]

b) Determine the forces in all the members of a truss shown in fig. 3.1. [12]

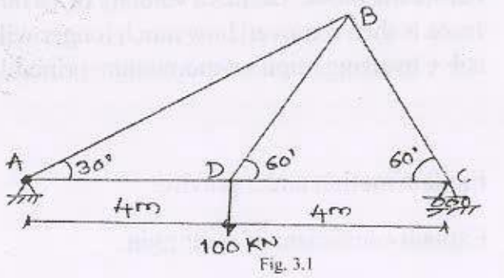


Fig. 3.1

SECTION-II

Q4) a) State and prove parallel axis theorem. [4]

b) Find the moment of inertia for the shaded area about centroidal both mutually perpendicular axes. Refer fig 4.1. [12]

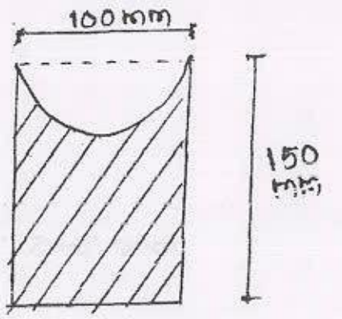


Fig. 4.1

Q5) a) Explain S-t, V-t and a-t curves. [6]

b) An elevator cage of mine shaft weighing 15 KN when empty is lifted or lowered by means of wire rope. Once man weighing 900 N entered in it and moving down with uniform acceleration such that when distance of 250 m was covered. The velocity of the cage 30 m/s. Determine the tension in the rope and force exerted by the man on the floor of the cage. [12]

OR

)6) Attempt any three of the following. [15]

a) Solve the following equations by Gauss-Jordan method
$x+y+z=5; 2x+3y+z=10; 3x-2y+2z=3$.

b) Use Jacobi's iteration method (Three iterations only) to solve
$5x+2y+z=12; x+4y+2z=15; x+2y+5z=20$.

c) Use Gauss-Seidal method (03 iterations) to solve the equations
$x+7y-3z=(-22); 5x-2y+3z=18; 2x-y+6z=22$.

d) Find the largest eigen value of matrix $A=\begin{bmatrix}1 & 6 & 1\\ 1 & 2 & 0\\ 0 & 0 & 3\end{bmatrix}$ by Rayleigh's power method with $x=\begin{bmatrix}1\\0\\0\end{bmatrix}$ as a base vector.

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Total No. of Pages : 4

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F.E. (All Branches) (Part-I) (Semester-I & II) (Revised) Examination, November - 2017
ENGINEERING MATHEMATICS-I
Sub. Code : 59177

Total Marks : 100

y and Date : Monday, 27-11-2017
me : 2.30 p.m. to 5.30 p.m.

structions : 1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

SECTION-I

)1) Attempt any three of the following. [15]

a) Find non-singular matrices P and Q such that PAQ is in the normal form and hence find rank of A where $A=\begin{bmatrix}1 & 2 & 3 & 4\\ 2 & 1 & 4 & 3\\ 3 & 0 & 5 & -10\end{bmatrix}$.

b) Discuss the consistency of the following system of equations and if possible solve them $2x-y-z=2, x+2y+z=2, 4x-7y-5z=2$.

c) Use matrix method to determine the value of λ for which the equations $x+2y+z=3, x+y+z=\lambda, 3x+y+3z=\lambda^2$ are consistent and solve them for any one value of λ.

d) Solve $2x-y+3z=0, 3x+2y+z=0, x-4y+5z=0$, by matrix method.

Q2) Attempt any three of the following. **[15]**

a) Examine for linear dependence of vectors (1,2,–1,0), (1,3,1,2), (4,2,1,0), (6,1,0,1) and find a relation between them if dependent.

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P.T.O.

b) Determine the Eigen values and Eigen vector corresponding to greatest Eigen value only, for $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$.

c) Find the Eigen values of matrix $A=\begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$. Hence find Eigen values for A^4, A^{-1}, $5A$ by using properties of eigen values.

d) Verify Cayley Hamilton theorem for $A=\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$.

Q3) Attempt any four of the following. **[20]**

a) Simplify $\dfrac{(\cos 5\theta - i\sin 5\theta)^2(\cos 7\theta + i\sin 7\theta)^{-3}}{(\cos 4\theta - i\sin 4\theta)^9(\cos\theta + i\sin\theta)^5}$.

b) Find all the values of $\left(\dfrac{1}{2}+i\dfrac{\sqrt{3}}{2}\right)^{\frac{1}{4}}$.

c) Prove that $\tanh^{-1}x=\dfrac{1}{2}\log\left(\dfrac{1+x}{1-x}\right)$.

d) Express $\dfrac{\sin 7\theta}{\sin\theta}$ in powers of $\sin\theta$ only.

e) Prove that $\left(\dfrac{\cosh x+\sinh x}{\cosh x-\sinh x}\right)^n=\cosh 2nx+\sinh 2nx$.

f) Express $\cos^{-1}\left(\dfrac{3i}{4}\right)$ in the form (a + ib).

SECTION-II

Q4) Attempt any three of the following. **[15]**

a) Expand $e^{x\cos x}$ in powers of x upto x^4 term.

b) Use Maelaurin's series to expand function $\tan\left(\dfrac{\pi}{4}+x\right)$ in a ascending power of x.

c) Use Taylor's series to find $\left(\sqrt{25.15}\right)$ correct upto four decimal places.

d) Evaluate $\lim\limits_{x\to 1}\left[\dfrac{x-x^x}{1+\log x-x}\right]$.

Q5) Attempt any four of the following. **[20]**

a) If $u=\log(x^3+y^3-x^2y-xy^2)$ then prove that $\left(\dfrac{\partial}{\partial x}+\dfrac{\partial}{\partial y}\right)^2 u=\dfrac{-4}{(x+y)^2}$.

b) If $u=\dfrac{1}{2}\log(y^2-x^2)$ then find the value of $\left(x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}\right)$.

c) If $u=xyz$; $v=x^2+y^2+z^2$; $w=(x+y+z)$ then find $J\left(\dfrac{u,v,w}{x,y,z}\right)$.

d) Find the minimum and maximum values of $(x^3+3xy^2-3x^2-3y^2+4)$.

e) If power P is given by $P=\left(\dfrac{E^2}{R}\right)$. Find the approximate percentage error in power P if E is increased by 3% and R is decreased by2%.

SF - 2

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester - I & II) (New)

Examination, November - 2017

ENGINEERING PHYSICS

Sub. Code: 59176

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Given:- Avogadro's number = 6.02×10^{26}/kg.atom
Planck's constant h = 6.63×10^{-34} J.s
Electronic charge e = 1.6×10^{-19} C
Electron mass m=9.1×10^{-31} kg

SECTION - I

Q1) Attempt Any Three from the following questions.

a) What is grating? Give theory of plane transmission grating for normal incidence. **[6]**

b) Explain construction and working of Laurent's half shade polarimeter. **[6]**

c) i) What is double refraction? **[3]**

ii) A tube of sugar solution 20 cm long is placed between crossed Nicols and illuminated with a monochromatic light. If the optical rotation produced is 13° and specific rotation is 65°dm/g/cm^3, determine the concentration of the solution. **[2]**

d) A grating has 6000 lines per cm on it. Its width is 10cm, calculate

i) the resolving power in the second order and

ii) the smallest wavelength that can be resolved in the third order in 6000 Å wavelength. **[5]**

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P.T.O.

Q2) Attempt Any Three from the following questions.

a) With neat diagram explain construction and working of ruby laser. [6]

b) Discuss industrial and medical applications of laser. [6]

c) Explain the advantages of optical fiber. [5]

d) With suitable diagram explain the terms : acceptance angle, acceptance cone and Numerical aperture of an optical fiber. [5]

Q3) Attempt Any Three of the following questions.

a) What is nuclear reactor? Explain various features used in the classification of a Nuclear reactor. [6]

b) Calculate the power output of a nuclear reactor which consumes 50gm of U^{235} Per day. Assume 5% reactor efficiency. Given: Energy released per fission of U^{235} Is 200MeV. [5]

c) What do you mean by thermonuclear reactions? Give proton-proton chain reaction. [5]

d) Write note on fusion power reactor. [5]

SECTION - II

Q4) Attempt Any Three from the following questions.

a) Find the number of atoms per unit cell, the coordination number and the atomic radius of BCC lattice. [6]

b) What are Miller Indices? How are they determined?
Draw the planes in cube (111) and (110) [6]

c) Explain the terms unit cell and their types. [5]

d) i) Explain the centre of symmetry. [2]

ii) A beam of X-rays of wavelength 0.71 Å is diffracted by (110) plane of rock salt with lattice constant of 2.8 Å. Find the glancing angle for the second order diffraction. [3]

Q5) Attempt Any Three from the following questions.

a) Discuss de-Broglie's concept of matter waves. Find an expression for the de-Brogile wavelength associated with a particle accelerated through a potential difference 'V' volts. [6]

b) What is Compton Effect? Explain experimental arrangement used to study Compton Effect. Write the formula for Compton Shift. [6]

c) State and explain Heisenberg's uncertainity principle. [5]

d) i) State properties of matter wave. [2]

ii) Determine the velocity and kinetic energy of a neutron having de-Broglie wavelength 1.0 Å. Mass of neutron is 1.67×10^{-27} kg. [3]

Q6) Attempt Any Three from the following questions.

a) With neat diagram explain construction and working of Atomic Force Microscope. [6]

b) Explain the electrical, magnetic and mechanical properties of nanomaterials. [5]

c) What are different types of the CNT? Explain any two properties of CNT in detail. [5]

d) Explain the ball milling method for getting nano particles. [5]

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SF-4

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester - I & II) (Revised) Examination, November - 2017

BASIC ELECTRICAL ENGINEERING

Sub. Code : 59178

Day and Date : Thursday, 09-11-2017 **Total Marks : 100**

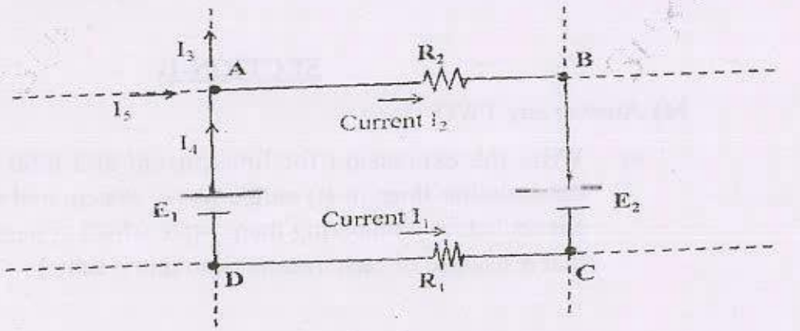
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled diagrams as a part of explanation.**
4) **In case of any missing data, assume suitable value. State it clearly.**

SECTION-I

Q1) Answer any TWO: **[2×9=18]**

a) State Kirchhoff's laws. Write KCL and KVL equations for node A and loop ABCDA in following circuit. Explain the sign rules used while writing your equations.



b) Derive an expression for Magneto motive force of a series magnetic circuit having three different magnetic materials. Draw equivalent electrical circuit and equivalent expression for the same.

c) An electric toaster has rating 1000 W, 240V. Find its resistance. The toaster is connected to 220V supply instead of the rated voltage. Now calculate current & power taken at 220V. If toaster works for 5 minutes, Calculate the cost of energy at Rs. 4/KWh.

P.T.O.

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Q2) Answer any TWO: **[2×9=18]**

a) Derive the mathematical expression for average value of sinusoidal AC by analytical method. Mention one application where average value of AC is important.

b) Define power factor in AC system. State causes and drawbacks of low power factor.

c) If a single phase series A.C. circuit has applied voltage $v = 100 \sin(wt + 20°)$ volt and current $i = 15 \sin(wt + 60°)$ ampere

Determine - Impedance, phase difference, power factor, Resistance, Reactance, Power.

Q3) Answer any TWO: **[2×7=14]**

a) Draw and explain working of single phase induction type energy meter.

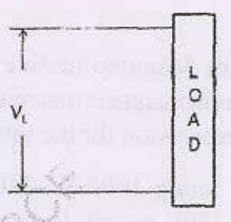
b) State the importance of earthing in electrical installation. Explain with neat sketch any one earthing method.

c) Draw circuit diagram and explain the operation of fluorescent tube working on sinusoidal AC voltage. State its advantages as compared to incandescent bulb.

SECTION-II

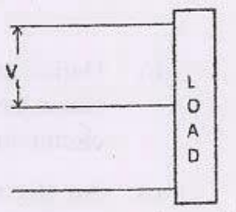
Q4) Answer any TWO: **[2×7=14]**

a) Write the expression for line current and total I^2R power loss in transmission lines in (i) single phase system and (ii) 3 phase system shown below. Comparing them, state which system is better. (Assume that resistance of each transmission line is same)



Load takes power P

Pf of load = cos Φ



Load takes power P

Pf of load = cos Φ

b) Draw circuit diagram for (i) star connected circuit (ii) delta connected circuit. Show line voltage, phase voltage, line current, phase current on each diagram. For each circuit, write the relation between (1) line voltage and phase voltage (2) line current and phase current.

c) Define and explain

i) balanced 3 phase supply

ii) phase sequence

iii) balanced 3 phase load

Q5) Answer any TWO: **[2×9=18]**

a) List the advantages of rotating field alternator as compared to rotating armature alternator. Why slip rings-brushes are required in an alternator?

b) Explain the working of transformer with load. Draw suitable diagrams.

c) Two windings of a transformer have 1000 turns and 500 turns. It is used as a step up transformer with 200 V ac supply and 0.8 pf load. The load current is 5A. Find (i) secondary voltage (ii) primary current (iii) the copper loss at this load, (iv) efficiency of transformer at this load,. Given: Iron loss of the transformer = 30W, Copper loss of the transformer at 1A load current is 3W.

Q6) Answer any TWO: **[2×9=18]**

a) State important features of universal motor. What are the disadvantages due to commutator?

b) List the differences between split phase induction motor and shaded pole induction motor? With reasons state which of the above motors is preferred for (i) compressor (ii) sound recording instrument.

c) Explain the working of split phase induction motor. Draw suitable diagrams.

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SF-6

Total No. of Pages : 3

Seat No.	

First Year Engineering (All Branches) (Semester - II) (New)

Examination, November - 2017

BASIC CIVIL ENGINEERING

Sub. Code :59179

Day and Date : Tuesday, 14- 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumptions wherever necessary and mention it clearly.**
4) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) a) Explain significance of branches of Civil Engineering. **[8]**

OR

a) Enlist various principles of building planning. Explain Privacy, Sanitation in detail. **[8]**

b) Write short note on orientation of building. **[4]**

c) Write down the specific Bye Laws for, **[4]**

i) Open space requirement

ii) FSI

Q2) Answer the following. **[18]**

a) Differentiate between:

i) Uniform and differential settlement

ii) Shallow and Deep foundation

b) Explain with neat sketch functions of different elements of substructure and superstructure.

c) What is deep foundation? Explain pile foundation with neat sketch.

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P.T.O.

3) a) Write short note on [8]

i) Different roofing materials.

ii) Types of cement with their properties.

OR

a) Differentiate between [8]

i) load bearing and framed structures.

ii) RCC steel and structural steel

b) What are the characteristics of good brick? [4]

c) Write uses of plastic as a Building material. [4]

SECTION - II

4) a) Classify surveying on the basis of instruments used? Explain the principles on which surveying works. [4]

b) State & Explain in detail Principle of Optical Square. [4]

c) The distance between two villages was measured with a 20 m chain and was found to be 2719 m. The same distance was measured with 30 m chain and was found to be 13,600 links. The test shows that both chains were incorrect. What correction is required in the 20 m chain, if the 30 m chain is 0.5 links too long? [8]

OR

Observed bearings for a closed compass traverse are given below. Find the local attraction at each end of the affected station and correct all bearings. Tabulate the data and results. Find also included angles. Show all calculations. [8]

Line	PQ	QR	RS	ST	TP
F.B	N 48° W	N 9° E	S 83° E	S 15° E	S 64° W
B.B	S 50° E	S 7° W	N 80° W	N 15° W	N 65° E

5) a) Attempt any Two questions from following

i) How planimeter is used for measuring areas of irregular figures? [4]

ii) Differentiate between Rise & fall method and collimation plane method. [4]

iii) Explain characteristics of contours with neat sketch. [4]

b) The following staff readings were observed on a continuously sloping ground with the help of a dumpy level and 4m staff at 30 m interval. The last reading was taken on B.M. of RL 240.120 m.

0.420, 1.660, 2.880, 0.580, 1.385, 2.270, 2.995, 3.800, 0.625, 2.365, 3.225, 3.630.

Enter the readings in a page of level book. Find R.L.s by Rise and Fall method. Apply usual checks. Determine longitudinal gradient. [10]

6) a) Differentiate between rigid and flexible pavement. [4]

b) Explain the components of railway track (Broad gauge). [4]

c) State the types of dams. Explain gravity dam with neat sketch. [4]

d) Explain with neat diagram functions of units in water treatment plant. [4]

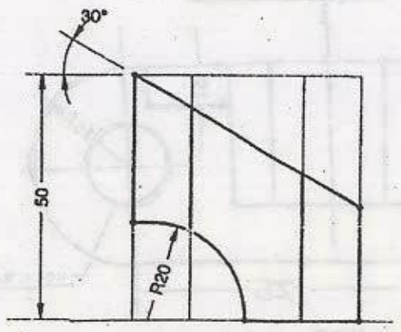
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Q6) Solve any one.

a) Solve.

i) A right circular cone of base dia. 50mm & axis 70mm stands on HP. It is cut by AVP which makes an angle 60° to VP & 8mm away from axis. Draw SFV, TV & true shape of section. [7]

ii) Figure shows FV of hexagonal prism with two cutting planes. Complete the development of lateral surfaces of prism. [6]



OR

b) Solve

A pentagonal base pyramid with base side 25mm & height 50mm is resting on HP. With one of its base edge perpendicular to VP. It is cut by section plane 45° to HP & passing through its RHS corner. Draw FV, sectional TV, and true shape of section also development of remaining part of pyramid. [13]

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Total No. of Pages : 4

Seat No.	

F. E. (All Branches) (Part - I) (Semester - I & II) (Revised)

Examination, November - 2017

ENGINEERING GRAPHICS

Sub. Code : 59180

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 06.30 p.m.

Instructions :
1) **Assume suitable data if necessary.**
2) **Use both sides of drawing paper.**
3) **All dimensions are in mm.**
4) **All questions are compulsory.**

SECTION - I

Q1) Solve any two : [12]

a) Construct hyperbola having focus 70 mm away from directrix and eccentricity 4/3. Also draw a tangent & normal at any point P on curve.

b) To construct an Archimedean spiral of two revolutions, given the greatest & shortest radius is 100mm & 10mm resp.

c) A circle of 50mm diameter rolls on horizontal line for half revolution clockwise and then on a vertical line for another half revolution. Draw the curve traced out by a point 'P' on base of circumference of circle.

Q2) a) Solve any three. [12]

i) Complete the projections of line AB having its TL is 60mm, bearing of S60E & FV makes an angle 30° to HP. (Ref. Fig. 1 (i))

ii) Find angle between line AB & CD. (Ref. Fig. 1 (ii))

iii) Line AB is parallel to line CD having true length 50 mm. Complete the projections of line CD. (Ref. Fig. 1 (iii))

iv) Find angle made by plane PQR with HP and VP. (Ref. Fig. 1 (iv))

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b) Solve. [13]

A triangular Plate ABC, AB = 60 mm, BC=45 mm and AC=30mm has its longest side in VP and inclined at 30° to HP. Draw its projections if its surface is inclined at 45° to the VP.

Q3) Solve. [13]

A right circular cylinder with 50mm dia. & height 70mm rest on Hp. Such that the base is inclined at 60° to HP & its axis is inclined 45° to VP. Complete projections of cylinder.

SECTION -II

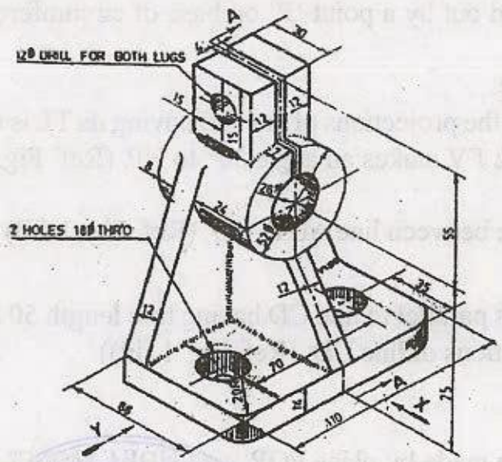
Q4) Solve. [24]

The following figure shows a bracket. Draw the following views:

a) FV from X direction

b) TV&

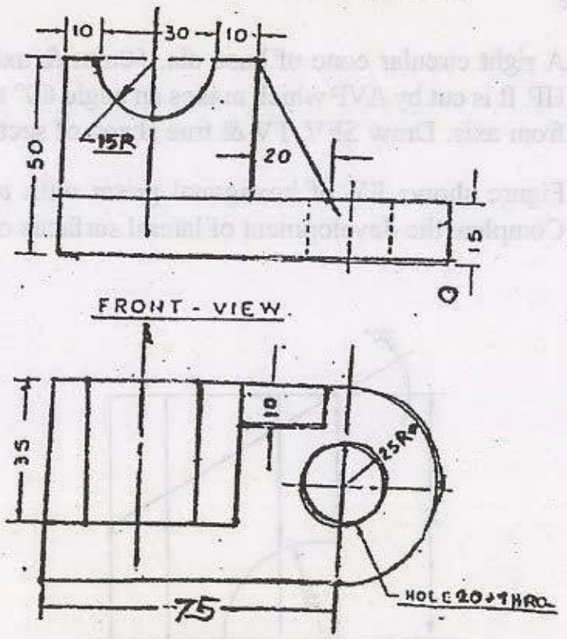
c) Sectional LHSV along section AA.



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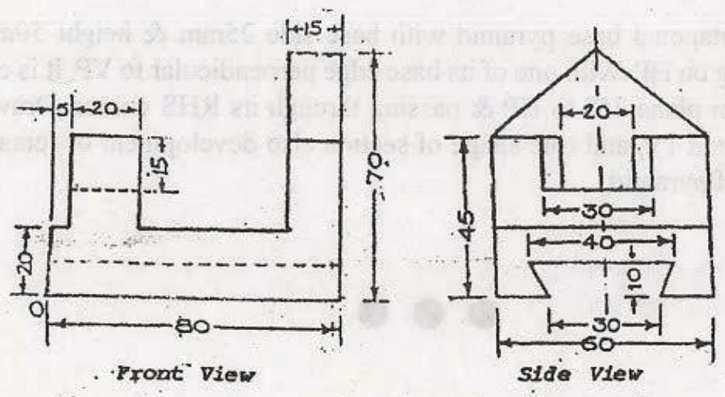
Q5) Solve any one. [13]

a) Figure shows the views. Draw its isometric view.



OR

b) Figure shows the views. Draw its isometric view. [13]



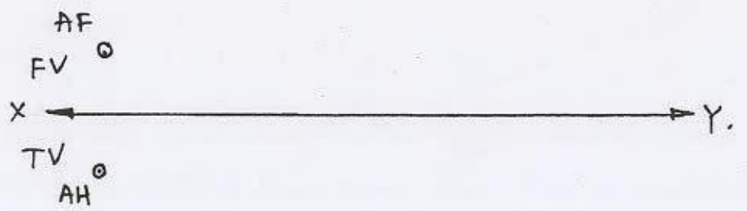


Fig 1 · (i)

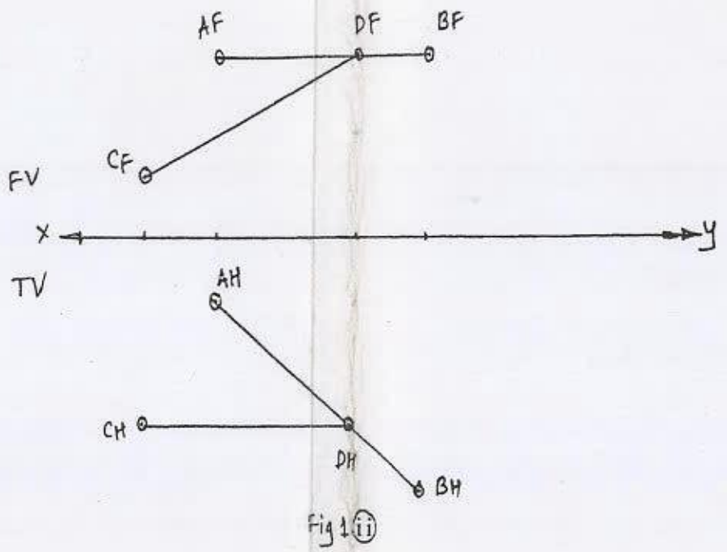


Fig 1 (ii)

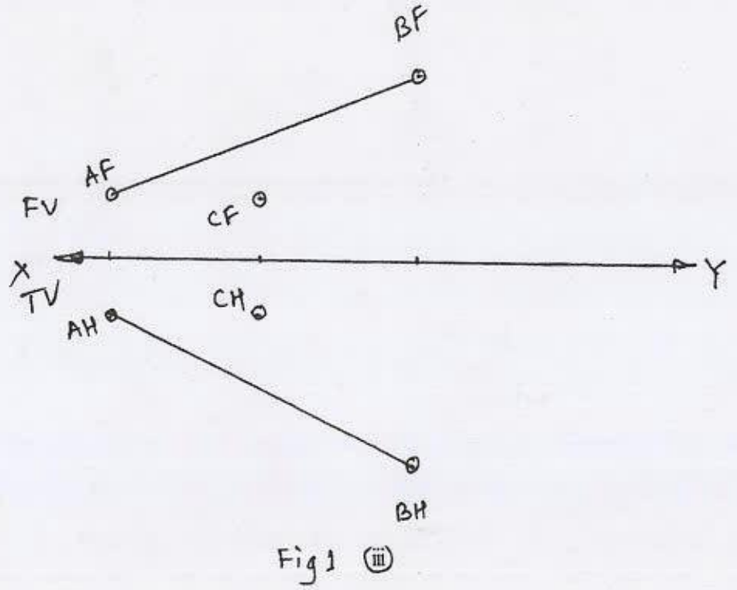


Fig 1 (iii)

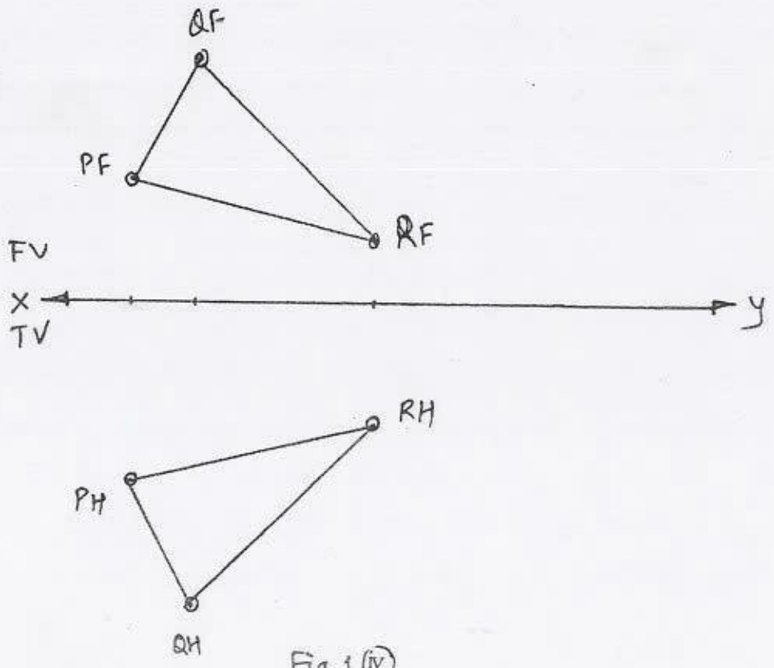


Fig 1 (iv)

Q.No.	1	2	3	4	5	6	Signature of the Examiner
Marks							

Sr. No. | Signature of Jr. Supervisor

Examination : _____ Paper No. _____ Section _____

Subject | Code No.

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Name of Exam : _____ | Code No.

Paper No. _____ Section _____

Seat No. _____ Centre _____

SF-3

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester- I & II) (Revised)
Examination, November - 2017
ENGINEERING CHEMISTRY
Sub. Code : 59183

Day and Date : Tuesday, 07-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary.**
3) **Draw neat labeled diagram wherever necessary.**
4) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) A sample of water on analysis was found to contain the following salts: **[8]**

Salt	Salt mass in mg/lit.	Mol. Wt.
$Ca(HCO_3)_2$	26.2	162
$Mg(HCO_3)_2$	21.9	146
$CaCl_2$	23.0	111
$MgSO_4$	36.0	120
NaCl	28.5	58.5

Calculate temporary, permanent and total hardness of sample in degree French.

b) Solve any two questions: **[10]**
i) What are the advantages and disadvantages of instrumental methods of analysis?
ii) Explain properties and applications of ERP.
iii) Explain reverse osmosis process for purification of water.

Q2) a) Explain the principle, construction and working of glass electrode. **[6]**

b) Solve any TWO of the following: **[10]**
i) What is scale and sludge formation? Explain mechanism of scale formation.
ii) Give preparation, properties and applications of Bakelite.
iii) What are composite materials? Explain the characteristics of composite materials.

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)3) Solve any four of the following: [16]

a) Write the applications of gas chromatography.

b) What is Dissolved Oxygen of water? Explain in detail.

c) State and derive an equation for Lambert's law.

d) Explain any four applications of nanomaterials.

e) Explain the addition and condensation polymerization reaction with suitable example.

f) Write note on acidity of water.

SECTION-II

)4) a) Solid fuel weighing 1.097gm and containing C = 90.7%, H = 6.7% and ash = 2.6%. Have the following results in the Bomb calorimeter experiment:

Water equivalent of calorimeter = 1230gm, Amount of water taken = 3376gm,

Initial temp. of water= 27.6°C, Correction due to acids = 68.7 cal.,

Cooling correction = 0.066 °C, Final temp. of water = 33.9°C,

Correction due to fuse wire = 9.0cal.

Calculate the gross and net calorific values of the solid fuel in Joule.[8]

b) Attempt any two questions: [10]

i) What is corrosion? Explain chemical corrosion with suitable diagram.

ii) How will you determine calorific value of liquid fuel?

iii) What is an alloy? Explain the purposes of alloying with suitable example.

)5) a) What are non ferrous alloys? Explain the nickel alloy giving their composition, properties and uses. [6]

b) Solve any two of the following: [10]

i) Compare of liquid fuel between gaseous fuels.

ii) Describe hydrogen evolution mechanism in wet corrosion with suitable diagram and reactions.

iii) Explain the factors influencing on the rate of corrosion.

)6) Answer of the following four questions: [16]

a) Explain in detail any four characteristic of a good fuel.

b) Discuss the importance of design in controlling corrosion.

c) Explain any four applications of Fuel Cells in various fields.

d) State composition, properties and uses of Duralumin.

e) Explain process of electroplating for prevention of corrosion.

f) Write short note on green chemistry.

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SF-236

Total No. of Pages : 2

Seat No.	

B.E. (CSE) (Part - IV) (Semester - VII) (Revised)
Examination, November - 2017
DISTRIBUTED SYSTEMS
Sub. Code : 67542

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Question 4 and question 8 are compulsory, attempt any two questions from que.1 to 3 from section I and que. 5 to 7 from section II.**

2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Explain the process of binding a client to a server in DCE RPC. **[8]**

b) What are different scaling techniques can be applied to achieve scalability in distributed system? **[8]**

Q2) a) Explain token ring mutual exclusion algorithm in detail. **[8]**

b) Define the terms error and fault. Classify and explain the faults. **[8]**

Q3) a) Explain UNIX semantics, Session Semantics and Immutable files semantics of file sharing. **[8]**

b) Explain the server replication mechanism used in CODA. **[8]**

Q4) Attempt any three **[18]**

a) Sensor networks.

b) Berkeley Algorithm.

c) Collaborative distributed systems.

d) Compound procedures used in ONC RPC in NFS v4.

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SECTION-II

Q5) a) Describe implementation level of virtualization in Cloud Computing? **[8]**

b) What is the benefits using virtualization in Cloud Computing? **[8]**

Q6) a) Explain virtualization at Application level? **[8]**

b) Explain Database as a Service (DBaaS) in Cloud Computing? **[8]**

Q7) a) What are different threats on Data stored in cloud? **[8]**

b) What are the advantages of "Platform as a Service" (PaaS)? **[8]**

Q8) Write note on **[18]**

a) Advantages of Using cloud storage gateways (CSG).

b) Cloud Firewall.

c) Virtual Firewall.

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Total No. of Pages : 2

Seat No.	

B.E. (CSE) (Part-IV) (Semester-VII) (Revised) Examination, November - 2017
ADVANCED DATABASE SYSTEMS
Sub. Code : 67543

Day and Date : Wednesday, 15-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary.**

SECTION-I

Q1) a) What do you mean by replication and fragmentation w.r.t. distributed database? Briefly explain the advantages and disadvantages to replication. **[8]**

b) What are transaction-server systems? For data server systems, explain the following **[8]**
i) Locking
ii) Data caching
iii) Lock caching

Q2) a) What is an Object Identity? Explain the system-generated OID and the immutability Property of an object. **[8]**

b) What is Persistent object? Explain the approaches to make the Object Persistent? **[8]**

Q3) a) State some of the object database features that have been included in SQL. Also give an example of UDTS in SQL to create complex structured object. **[8]**

b) With the help of an appropriate figure of the database life cycle, explain in detail database initial study phase. **[8]**

P.T.O.

Q4) Write short notes on any three: [18]

a) 2-phase commit

b) ODL

c) Persistence

d) top-down versus bottom-up design

SECTION-II

Q5) a) Explain the intuition behind the two rules in the Bell-LaPadula model for manadatory access control. [4]

b) Give an example of how covert channels can be used to defeat the Bell-LaPadula model. [4]

c) Explain the statistical database security. [8]

Q6) a) Explain document type definition. Describe a DTD with suitable example for an XML. [8]

b) Write the applications of XML. [4]

c) What is Xquery? Explain FLOWR expression with example? [4]

Q7) a) What is data warehouse? What is the difference between data warehouse and operational database system? [6]

b) Explain Following [4]

i) Data cube

ii) OLAP

c) With neat schematic explain business intelligence architectural components? [6]

Q8) Write a short note on(any three) [18]

a) Polyinstantiation

b) XML schema

c) Classification algorithm

d) Grant and Revoke with example.

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SF - 430

Total No. of Pages : 3

Seat No.	

B.E. (Computer Science and Engineering) (Semester-VII) Examination, November - 2017

MOBILE APPLICATIONS (El. - 1)

Sub. Code : 67546

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m to 5.30 p.m.

Instructions :
1) **Figures to the right indicates full marks.**
2) **Question no 4 and 8 are compulsory**
3) **Attempt any two questions from remaining questions in each section**

SECTION - I

Q1) a) What are mobile website navigatation techniques **[6]**

b) What is native app, hybrid app and web app in mobile app technology stack. **[6]**

c) Explain about standard OMA. **[4]**

Q2) a) Write a note on HTML 5. **[6]**

b) Explain in detail about WAP 1.0 **[6]**

c) Write short note on Web Services **[4]**

Q3) a) Explain the difference between XML and JSON **[6]**

b) What are the best practices while designing a mobile website? **[6]**

c) Explain in detail about Fallback mechanism. **[4]**

P.T.O.

Q4) Write short note on (Any Three) **[18]**

a) Android emulator

b) W3C

c) RESS

d) Tools for Mobile Web Development

SECTION - II

Q5) a) Explain the role of responsive images in mobile application development How we can use Sencha. IO to create responsive images **[6]**

b) Explain various problems mobile application developer face regarding feature support on a particular platform. Briefly describe their solutions. **[6]**

c) Describe how we can use HTTP header for device detection at server side **[4]**

Q6) a) Explain in detail JavaScript APIs for handling touch and gesture events in mobile application **[6]**

b) Compare Zepto.js with jQmobi. **[6]**

c) What is J2ME? How are the tools available for J2ME programming? **[4]**

Q7) a) Describe how W3C Geolocation API is used for getting a location as well as tracking a particular location. **[6]**

b) Compare Native App And Mobile Web App. **[6]**

c) List various JavaScript mobile UI patterns. Explain ANY one. **[4]**

Q8) Write a short note on (any three) **[3×6=18]**

a) Web Sockets.

b) Device Interaction.

c) GSMA One API.

d) HTTP Sniffing.

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Total No. of Pages : 2

Seat No.	

B.E. (Computer Science & Engg.) (Semester - VIII) (Revised) Examination, November - 2017

DATA ANALYTICS

Sub. Code : 67824

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Q.4 & Q.8 are compulsory.**
3) **Attempt any two questions from Q.1, to Q.3 and from Q.5 to Q.7.**

Q1) a) Explain the phases in the developments of Business Intelligence System with the help of neat diagram? **[8]**

b) Explain Star Schema, Snowflake Schema, Galaxy Schema with proper example? **[8]**

Q2) a) Explain different categories of mathematical models for decision making? **[8]**

b) Explain in detail process of univariate analysis? **[8]**

Q3) a) Explain HDFS Architecture and the working of Hadoop Heartbeat message in HDFS with proper figure? **[8]**

b) Explain data validation process in data preparation. **[8]**

Q4) Write a note on (Attempt Any Three) : **[18]**

a) Data Warehouse Architecture.

b) Hive, HBase, Pig & Pig Latin.

c) Multivariate Analysis.

d) Data mining tasks.

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Q5) a) Explain simple linear regression model and structure of regression model. **[8]**

b) Discuss the structure and phases of the learning process for a classification with a neat diagram. **[8]**

Q6) a) Explain in detail any one algorithm used for partition methods. **[8]**

b) Explain the general association rules that is useful for range of applications. **[8]**

Q7) a) List and explain the different functions to handle the data in R workspace with an example. **[8]**

b) List and explain the various types of R commands to import data. **[8]**

Q8) Write a short note on (Any Three) : **[18]**

a) Bayesian methods.

b) Exporting data from R.

c) Hierarchical clustering methods.

d) Apriori algorithm.



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Total No. of Pages :2

Seat No.	

B.E. (Computer Science) (Semester - VIII) (Revised) Examination, November - 2017
REAL-TIME OPERATING SYSTEM
Sub. Code:67826

Day and Date :Friday, 03 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions : 1) **Solve Any Three Questions from each section.**
2) **Figures to right indicate full marks.**

SECTION-I

Q1) a) What is Real-Time System? Explain Real-time system examples. **[8]**

b) Explain following terminologies related to hardware interfacing: **[8]**

i) Latching

ii) Edge vs Level Triggered

iii) Tristate logic

iv) IEEE 1394 Firewire

Q2) a) Explain memory-mapped I/O with suitable diagram. **[8]**

b) Explain operation of mailboxes? How critical section problem can be handled using mailboxes? **[8]**

Q3) a) What is priority inversion ? Explain priority ceiling protocol. **[8]**

b) Explain task control block model in detail. **[8]**

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Q4) Write a note on- (Any Three) **[18]**

a) Polled loop

b) Test-and-Set-Instruction

c) Watchdog timers

d) Ring Buffers

SECTION -II

Q5) a) Explain requirement engineering process in desing of real time systems. **[8]**

b) What are formal methods in software specification? State its limitations. **[8]**

Q6) a) Explain how to organize the requirements document. **[8]**

b) What is COCOMO? Explain COCOMO-II in detail. **[8]**

Q7) a) Explain real-time features of C# and Java. **[8]**

b) Explain semaphore and mutex management in RTLinux. **[8]**

Q8) Write a note on-(Any Three) **[18]**

a) Mc Cabe's Metric

b) Function points

c) RTLinux

d) Assembly language

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SF-962

Total No. of Pages : 2

Seat No.	

B.E. (Computer Science and Engg.) (Semester-VIII)
(Revised) Examination, November - 2017
SOFTWARE TESTING AND QUALITY ASSURANCE
(Elective-II)
Sub. Code : 67828

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **Q. 4 and Q. 8 are Compulsory.**
2) **Attempt any two questions from Q. 1 to Q. 3.**
3) **Attempt any two questions from Q. 5 to Q. 7.**

SECTION-I

Q1) a) What is software testing? Why should we test? **[8]**

b) Explain V shaped software lifecycle model. **[8]**

Q2) a) What are different software verification methods? **[8]**

b) What do you mean by software project audit? Explain in brief project audit and review checklist. **[8]**

Q3) a) Explain use cases and use case diagram in detail? **[8]**

b) What is regression testing? **[8]**

Q4) Write a note on (Any two): **[18]**

a) Software failures with example.

b) SRS document verification.

c) Risk analysis.

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SECTION-II

Q5) a) Which are broad categories of software metrics? Explain in detail. **[8]**

b) Compare client server application and web based application. **[8]**

Q6) a) What should we measure during testing? **[8]**

b) Write a note on user interface testing. **[8]**

Q7) a) Which are the several problems with the function points measure? **[8]**

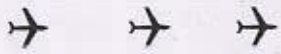
b) What is automated test data generation.? **[8]**

Q8) Write a note on (Any two): **[18]**

a) Measurement in software engineering.

b) Albretch's approach.

c) Security testing.



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Total No. of Pages : 2

Seat No.	

B.E. (Computer Science & Engg.) (Semester - VIII) (Pre-revised) (Old) Examination, November - 2017

GRID TECHNOLOGY

Sub. Code : 49447

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Q.4 & Q.8 are compulsory.**
2) **Attempt any two questions from Q.1, Q.2, Q.3.**
3) **Attempt any two questions from Q.5, Q.6, Q.7.**
4) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) With schematic explain basic structure of GT3 and their base services. **[8]**

b) What is grid computing? What are the types of grid computing? Explain different topologies of grid computing? **[8]**

Q2) a) Explain semantic workflow enactment in geodise. **[8]**

b) What is autonomic computing? Explain the features of autonomic computing? **[8]**

Q3) a) What is RDF? Why RDF is essential in GRID? Explain RDF data model. **[8]**

b) Define web service and explain the structure of soap and wsdl. **[8]**

Q4) Write a short note on (Any Three) : **[18]**

a) Grid related standard bodies.

b) Portal Lab.

c) RPC.

d) OGSA and OGSI.

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SECTION - II

Q5) a) Explain the role of directory service, producer and consumer in GMA? **[8]**

b) With neat schematic explain different daemons in condor pool. **[8]**

Q6) a) Explain cloud deployement models? Discuss about pros and cons cloud computing? **[8]**

b) What is virtualization? What are the characteristics of virtualization? Explain foundational issues of virtualization. **[8]**

Q7) a) What is storage as a service provider? Explain different aspects of data security. **[8]**

b) Explain Job life cycle and Job Management in Codor. **[8]**

Q8) Write a short note on (Any Three) : **[18]**

a) SOA.

b) Credential delegation & single sign-on.

c) Client Desktop.

d) Scheduling Paradigms.

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T.E. (Mechanical) (Part-III) (Semester - VI) (Revised) Examination, November - 2017

METROLOGY AND QUALITY CONTROL

Sub. Code :66839

Day and Date : Friday , 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume any data if necessary and state it clearly**

Q1) Solve any two of the following **[18]**

a) What is the limit gauges. Explain the 'Taylor's principle for design of 'limit gauges'

b) Explain the following terms with neat sketch.

i) Unilateral tolerance

ii) Bilateral tolerance

iii) Upper deviation

iv) Lower deviation

c) Calculate the limits of the following 25 H7 d8 designated fit, identify it and draw it graphically, the standard tolerance is given by

$i = 0.45D^{\frac{1}{3}} + 0.001D$

i) 25 lies between steps of 18-30mm

ii) Fundamental deviation of d shaft=$-16D^{0.44}$

iii) for grade IT7 tolerance = 16i and for IT8 tolerance=25i

iv) Fundamental deviation of H-hole=0

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Q2 Solve any two of the following [16]

a) Compare mechanical comparator with optical comparator with the help of neat sketches.

b) Explain the use of sine bar for measuring an angle with the help of neat sketch and state its limitations.

c) Explain construction, working and limitations of sigma comparator.

Q3) Solve any two of the following [16]

a) Define straightness and flatness. Briefly explain how straightness and flatness is measured and specified.

b) Explain principle and working of Tomlinson's surface meter with neat sketch.

c) Define surface texture, Lay and explain ten point average method for surface finish measurement.

Q4) Solve any two of the following [16]

a) Define major diameter, effective diameter and enumerate various errors in screw thread.

b) Derive an expression for effective diameter measurement by 2-Wire method for external threads.

c) Describe the gear tooth vernier caliper and explain its use for checking tooth thickness.

Q5) Solve any two of the following [16]

a) Differentiate between quality control and quality assurance.

b) What is cost of quality? Explain cost of failure, cost of appraisal and cost of prevention.

c) Discuss the factors that control, quality of design and quality of conformance.

Q6) Solve any two of the following [18]

a) State the advantages, applications of control charts and sketch different patterns of control charts

b) Discuss following acceptance sampling terms

i) Average out going quality

ii) Average out going quality level

iii) Accepted quality level

c) A machine is working to a specification 80.75± 0.1mm a study of 32 consecutive pieces shows the following measurements. Construct the $\overline{X}$ and R chart and calculate process capability (For sample size of 8 take A_2 =0.37, D_4 =1.86, D_3 =0.14,d_2=2.847)

1st day	2nd day	3rd day	4th day
80.74	80.76	80.77	80.73
80.73	80.76	80.72	80.75
80.72	80.75	80.77	80.81
80.74	80.73	80.71	80.77
80.74	80.75	80.73	80.74
80.76	80.75	80.74	80.74
80.78	80.77	80.76	80.80
80.78	80.77	80.80	80.81

& & &

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Total No. of Pages :3

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T.E. (Mechanical) (Semester - VI) (Revised) Examination, November - 2017
INDUSTRIAL FLUID POWER
Sub. Code: 66838

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Draw neat diagrams/sketches wherever necessary.**
3) **Figures to right indicates full marks.**

Q1) Solve any two:

a) Explain in brief the basic requirements of a Pneumatic system. **[7]**

b) Explain the important properties of hydraulic fluids. **[7]**

c) Draw the symbols and explain the function of the following elements:**[7]**

i) F.R.L unit

ii) Four way, three position-open center solenoid operated D.C valve.

iii) Weight loaded Accumulator.

iv) time delay valve.

Q2) Solve any three:

a) Explain the working of swash plate type axial piston pump with neat sketch. **[6]**

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b) Explain the function of cushioning in cylinders with neat sketch. **[6]**

c) Explain fluid conditioning and also explain with neat symbols types of reservoirs. **[6]**

d) Classify intensifiers and explain any one of them. **[6]**

Q3) Solve any three:

a) Draw a schematic of 4/2 pilot operated DCV and briefly explain its function. **[6]**

b) Draw schematically a sequence valve and explain its function. **[6]**

c) Explain the working of pressure compensated flow control valve with neat sketch. **[6]**

d) Explain use of any two center positions of D.C valves in hydraulic circuits. **[6]**

Q4) Solve any three:

a) Explain with neat sketch working of screw compressor used in pneumatic systems. **[6]**

b) Explain schematically different piping layouts in Pneumatic systems. **[6]**

c) Explain with the help of neat sketch the construction and working of air motor. **[6]**

d) Explain the working of 5/2 Direction control valve with a neat sketch. **[6]**

Q5) Solve any Three.

a) A vehicle is raised and held for about five hours and is to be descended slowly without any jerks, suggest and draw a suitable hydraulic circuit for the same. **[6]**

b) Explain the speed control circuit for an air motor. **[6]**

c) With the aid of circuit diagram explain the use of shuttle valve in pneumatic circuit. **[6]**

d) Explain with circuit diagram travel dependent sequencing mechanism in hydraulic system. **[6]**

Q6) Write short notes on: (Solve any two)

a) Pneumatic servo system. **[7]**

b) Safety precautions in handling hydraulic systems. **[7]**

c) Fluidics. **[7]**

What will be your decision under the following approaches

i) Optimistic Criterion

ii) Pessimistic Criterion

iii) Leplace Criterion

iv) Hurwicz Criterion ($\alpha = 0.7$)

c) Draw the project network for the following activities and determine critical path and project duration.

Activity	Preceding activity	Duration (days)
A	-	8
B	A	12
C	A	8
D	B,C	7
E	A	8
F	D,E	17
G	C	21
H	F,G	9
I	H	11

d) Determine optimal sequence, elapsed time and idle time of the following six jobs on the machine M1,M2 and M3 used in the same sequence to process these jobs.

	Jobs					
Machines	J1	J2	J3	J4	J5	J6
M1	15	14	16	13	10	8
M2	8	10	7	15	11	9
M2	8	10	7	15	11	9

Total No. of Pages :4

Seat No.	

T.E. (Mechanical) (Part - II) (Semester - VI) (Revised) Examination, November - 2017

INDUSTRIAL MANAGEMENT & OPERATIONS RESEARCH

Sub. Code: 66837

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**
4) **All questions are to be solved on one answer book only.**

Q1) Attempt any four (5 Marks Each) **[20]**

a) State the need of planning in manufacturing a component from vendors.

b) Explain in brief Process of Organizing.

c) Is there any difference between Authority & Responsibility. Justify your answer with suitable example.

d) Discuss the implications of the Herzberg's theory as a strategy for motivating employees.

e) Whether controlling is an essential function of management? If yes then explain the steps involved in controlling process?

Q2) Attempt any two (6 Marks Each) **[12]**

a) Which factors related to environmental influence sugar manufacturing industry?

b) What are the problems of SSI involved in manufacturing components of automobile sector?

c) How to prevent an accident in a gas welding section of fabrication unit? Does the purchasing of safety equipments increases cost of operation?

Q3) Write short notes on any three (6 Marks Each) **[18]**

a) Types of markets

b) 4 P's of market

c) Functions of Purchase department

d) Purchase policy and procedure

e) Cost estimation

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Q4) Attempt any three (6 Marks Each) **[18]**

a) Define Operations Research. Briefly explain the characteristics of Operations Research.

b) Use graphical method to solve the following,

Maximize $Z = 5X_1 + 4X_2$

Subjected to constraints,

$5X_1 + 2X_2 \leq 40$,

$3X_1 + 3X_2 \leq 30$

$3X_1 + 5X_2 \leq 45$

$X_1, X_2 \geq 0$.

c) A company manufactures three jobs namely X, Y and Z. Each of the product require processing on three machines, Turning, Milling and Drilling. Product X requires 5 hours of turning, 2 hours of milling and 20 minutes of drilling. Product Y requires 3 hours of turning, 5 hours of milling and 30 minutes of drilling, and Product Z requires 1 hour of turning, 2 hours of milling and 30 minutes of drilling. In the coming planning period, 270 hours of turning, 220 hours of milling and 50 hours of drilling are available. The profit contribution of X,Y and Z are Rs. 500, Rs.750 and Rs. 1000 per unit respectively. Formulate LPP to maximize the profit. Suggest suitable method for solution of LPP.

d) Use simplex to solve the following problem and obtain initial and second feasible solution (two simplex tables only)

Minimise $Z = 5X_1 + 3X_2 + 2X_3$

subjected to constraints,

$3X_1 + 2X_2 + 2X_3 \leq 120$,

$2X_1 + 3X_2 + 3X_3 \leq 240$

$X_1, X_2, X_3 \geq 0$.

Q5) Attempt any two (7 Marks Each) **[14]**

a) How does the problem of degeneracy arise in a transportation problem? Explain how one can overcome it?

b) The unit transportation cost along with capacity and requirements from a supplier to a restaurant is as given below

Supplier	Restaurant				Capacity
	1	2	3	4	
A	25	40	75	20	4000
B	50	40	65	25	3000
C	25	50	70	40	3000
Requirements	1600	2400	3000	2000	

Obtain initial basic feasible solution by least cost method & VAM

c) A company has four workers and five jobs. Expected profit in Rs. for each job when assigned to different workers is given in the matrix below. Solve the assignment problem & estimate the total profit

Worker	Jobs				
	A	B	C	D	E
1	60	76	48	99	80
2	69	82	59	71	57
3	85	90	109	69	79
4	46	62	85	75	78

Q6) Write short notes on any three (6 Marks Each) **[18]**

a) Explain the various quantitative methods that are useful for decision making under risk.

b) The following matrix gives the payoff (in Rs.) of different strategies against events.

Strategies	Events			
	E_1	E_2	E_3	E_4
S_1	4,000	100	6,000	18,000
S_2	20,000	5,000	400	0
S_3	20,000	15,000	2,000	1,000

Total No. of Pages : 3

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T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MANUFACTURING ENGINEERING

Sub. Code : 66245

Day and Date : Wednesday, 22 - 11 - 2017 Total Marks : 100

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume if necessary suitable data and state them clearly.
4) Use of non-programmable calculators is permissible.

SECTION - I

Q1) Solve any two:

a) Explain with neat sketch the types of milling cutters. [8]

b) Derive an expression for Shear strain. [8]

c) In an Orthogonal cutting of the material, Cutting force (F_H) =138Kg, Feed force (F_v) = 68Kg, Rake angle (α) =7°, Chip thickness ratio (r) = 0.4. Determine

i) Coefficient of friction of chip

ii) Shear force (Fs) and normal to shear force (Fn). [8]

Q2) Solve the following questions.

a) Define machinability. Explain the factors affecting machinability. How the machinability index is defined? [8]

OR

a) Explin concept of wear & types of wear with sketch. [8]

b) Determine [8]

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P.T.O.

i) Taylor's Tool life equation

ii) Cutting speed for 6 minutes of tool life when tool life of 70 minutes is obtained at a speed of 25m/min and 15 minutes at 40m/min.

The component shown in fig. is to be processed on a single spindle automat. Study the component and prepare: **[18]**

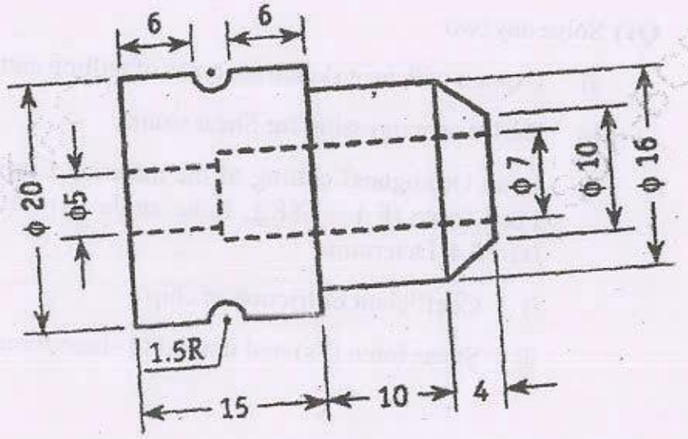
a) Detailed process sheet

b) Tool Layout

c) Cam profile for drilling operation-of ϕ5 mm hole through

d) Calculate Production rate per hour

Material –ϕ 20 Bronze bar All dimensions are in mm.



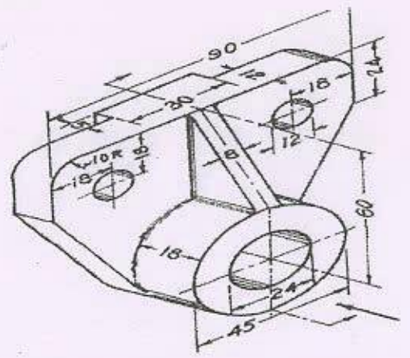
SECTION - II

Q4) Design & draw neat dimensional drawing in three views with one sectional view of jig for drilling two holes ϕ12 in the given bracket as shown in figure. **[26]**

OR

Design & draw neat dimensional drawing in three views with one sectional view of Milling fixture for creating plane surface of ϕ 24mm of the given bracket as shown in figure.

Also Justify the selection of location, clamping & guiding elements.



) Attempt any two.

a) Explain with neat sketch the Compound die. **[6]**

b) Explain types of Stock stop. **[6]**

c) Explain the importance of following in Press working **[6]**

i) Strippers

ii) Clearanace

[12]

6) Write short notes any three.

a) Construction & working of CNC.

b) Automatic Tool Changer.

c) CNC axes and drives.

d) Modular Tooling System.

Q6) a) Explain the step by step procedure for selection of V- belt from Manufacturer's Catalogue. [6]

b) It is required to select flat belt drive for a fan running at 360 rpm which is driven by a 10kW 1440 rpm motor. The belt drive is open type and space is available for a center distance of 2 m approximately. The belt should operate at velocity between 17.80 m/s to 22.90 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0118 kW. The load correction factor can be taken as 1.2. Suggest preferred pulley diameters for the motor and fan pulleys and give complete specifications of belting. Refer the tables given below. [10]

Arc of Contact Factor (F_d)

α_s(Deg)	130	140	150	160	170	180	190	200
F_d	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard Widths of these belts in mm

3–Ply	25	40	50	63	76					
4–Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

For flat pulleys: Series of preferred values of pitch diameters (in mm) are as follows.

Pitch diameter (mm):	125	132	140	150	160	170	180	0	
200	212	224	236	250	265	280	300	315	355	375
400	425	450	475	500	530	560	600	630	670	710
750	800	900	1000							

Total No. of Pages :4

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T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MACHINE DESIGN - I

Sub. Code: 66244

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumption wherever required and state them clearly.**
4) **Use of non-programmable calculator is permitted.**
5) **Draw neat diagrams wherever necessary.**

Q1) Solve any Three: [18]

a) Summarize material selection procedure adopted for designing a machine element.

b) Name different theories of failure.Illustrate the use of theory of failure for brittle material.

c) Explain the design procedure for a turn-buckle with the help of neat sketch.

d) Write a note on design of bolted joints with load perpendicular to the axis of bolt.

Q2) a) A bell crank lever to raise a vertical load is shown in fig 2a. The vertical load to be lifted is 4500N. The lever consists of forged steel material and a pin at the fulcrum F. Assume following data for the lever material. Safe stress in tension = 75 MPa; safe stress in shear=60MPa; safe bearing pressure on pins=10N/mm². Determine the pin diameter at end P, dimensions at F and cross section Y-Y (near to fulcrum) [8]

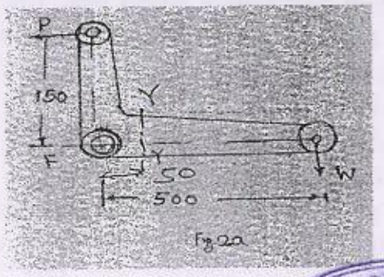
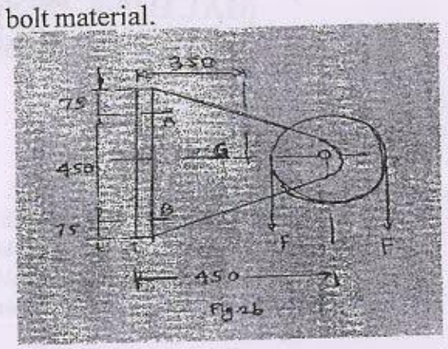


Fig 2a

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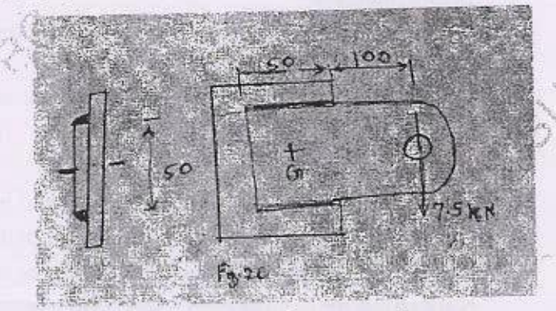
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b) Figure 2b shows a pulley bracket, which is supported by 4 bolts, two at A and two at B. The weight of pulley and bracket, W is 1850N, and the load, F on the rope is 20kN.
Determine the size of the bolts, using an allowable shear stress of 40 MPa for the bolt material. **[8]**



OR

c) A welded connection as shown in figure 2c is subjected to the eccentric force of 7.5 kN. Determine the size of welds if the permissible shear stress for the weld is 90N/mm². Assume static conditions. **[8]**



Q3) a) Discuss the design procedure for square key. **[6]**

b) A splined connection with the following particulars is used for a gear and shaft assembly in a gear box. The power to be transmitted is 20kW at 240 r.p.m. The bearing pressure on the splines is limited to 6.5.MPa during sliding. The coefficient of friction is 0.1 **[10]**
Major diameter = 60mm
Minor diameter = 54 mm
Number of splines = 10
Determine (i) The length of gear hub
ii) The force required to shift the gear.

OR

c) Design a cast iron protective type flange coupling to transmit 15 kW at 900 r.p.m. from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used:
Shear stress for shaft, bolt and key material =40MPa
Crushing stress for bolt and key = 80 MPa
Shear stress for cast iron = 8 Mpa
Draw a neat sketch of the coupling. **[10]**

Q4) a) What are the various types of springs used in practice? Explain one application of each. **[6]**

b) Design a close coiled helical compression spring for a service load ranging from 2245N to 2745N. The axial deflection of the spring for this load range is 6mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity is 84kN/mm². Assume squared and ground ends for coil. Neglect the effect of stress concentration. Draw fully dimensioned sketch of the spring.
Std. wire gauge (SWG) number and corresponding diameter of spring wire is given in the following table. **[10]**

SWG	6/0	5/0	4/0	3/0	2/0
Diam.mm	11.785	10.973	10.160	9.490	8.839

Q5) a) Derive an expression for maximum efficiency for square threaded screw. **[6]**

OR

What is recalculating ball screw? Explain with neat sketch.

b) The power transmission screw of a screw press is required to transmit maximum load of 100 kN and rotates at 60 RPM. The trapezoidal threads are to be used as under:

Nominal Dia. mm	40	50	60	70
Core Dia. mm	32.50	41.50	50.50	59.50
Mean Dia. mm	36.50	46.00	55.50	65.00
Core Area mm²	830	1353	2003	2781
Pitch mm	7	8	9	10

The screw thread friction coefficient is 0.12. The torque required for collar friction and journal bearing is about 10% of the torque to drive the load considering screw friction. Determine screw dimensions and its efficiency. Also determine the motor power required to drive the screw. The maximum permissible compressive stress in the screw is 100 MPa. **[12]**

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Total No. of Pages : 3

Seat No.	

T.E. (Mechanical) (Part-III) (Semester-V) (Revised)
Examination, November - 2017
HEAT AND MASS TRANSFER
Sub. Code : 66243

Day and Date : Tuesday, 14-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume Suitable Data wherever necessary and state it Clearly.**
4) **Use of scientific non programmable calculator is permitted.**

Q1) Solve any three:

a) Define critical radius of insulation. Also derive the equation for critical radius of insulation for hollow sphere. **[6]**

b) Explain the different modes of mass transfer. Explain with suitable examples. **[6]**

c) A 0.8m high and 1.5m wide double pane window consist of two 4mm thick layer of glass (k = 0.78 W/mK) separated by 10mm wide stagnant air space (k = 0.0626 W/mK). Determine the rate of heat transfer through this window when room is maintained at 20°C and outside air is at -10°C. Take convective heat transfer coefficient as 10 and 40 W/m²K. **[6]**

d) An aluminum pipe carries steam at 110°C. The pipe (k = 185 W/mK) has an inner diameter of 10cm and outer diameter of 12cm. The pipe is located in a room where the ambient air temperature is 30°C and convective heat transfer coefficient is 15 W/m²K. Determine heat transfer rate per unit length of pipe. Neglect convective heat transfer on steam side. **[6]**

Q2) Solve any two:

a) Derive expression for temperature distribution of a solid cylinder generating heat at the rate of q unit per unit volume. **[8]**

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b) Derive expression of temperature distribution for a solid body by using lumped heat capacity approach. **[8]**

c) A solid copper sphere of 10cm diameter (ρ = 8954 kg/m^3, C_p = 383 J/kgK, k = 386 W/mK). Initially at uniform temperature 250°C, it suddenly immersed in a fluid which is maintained at uniform temperature of 50°C. The heat transfer coefficient between sphere and fluid is 200 W/m^{2}K. Determine the temperature of copper sphere at 5 minutes after immersion. **[8]**

Q3) Solve any two:

a) Derive an expression for temperature distribution along the length of a pin fin with insulated tip. **[8]**

b) A 1m long, 5cm diameter cylinder placed in an atmosphere of 40°C is provided with 12 fins (k = 75 W/mK), 0.75mm thick, The fins protrudes 2.5cm from the cylinder surface. The heat transfer coefficient is 23.3 W/m^{2}K. Calculate the rate of heat transfer if the surface temperature of cylinder is 150°C. **[8]**

c) Determine thermal conductivity of long solid 2cm diameter rod, 1 end of the rod is inserted in a furnace while remaining portion is projected out in air at 30°C. After steady state has been reached, the temperature at two points on the rod which are 10cm apart are measured and found to be 120°C and 90°C respectively. If heat transfer coefficient is 20 W/m^{2}K. What will be thermal conductivity of the rod? **[8]**

Q4) Solve any two of the following:

a) With the help of dimensional analysis, analyze natural convection heat transfer problem. **[8]**

b) A vertical cylinder 1.5m high and 180mm in diameter is maintained at 100°C in an atmosphere environment of 20°C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean film temperature as, ρ= 1.06 kg/m^3, γ= 18.97×10^{-6}m^2/s, C_p=1.004 kJ/kg°C and k=0.0285 w/m°C, Pr = 0.708. **[8]**

Use correlation; $Nu_L = 0.10\ (Gr.Pr)^{1/3}$.

c) Air at a temperature of 20°C flows through a rectangular duct with a velocity of 10m/s. The duct is 30cm×20cm in size and air leaves at 34°C. Find the heat gain by air when it is passed through 10m long duct. The properties of air at 27°C are ρ=1.1774 kg/m^3, γ= 15.68 10^{-6}m^2/s, C_p=1057 J/kgK and k=0.03003 W/mK, Pr = 0.708. **[8]**

Use correlation ; $Nu = 0.023\ (Re)^{0.8}\ pr^{0.4}$.

Q5) Solve any two of the following:

a) Write a short notes on; **[8]**

i) Shape factor and its properties

ii) Radiation shield

b) Write plank's law and derive Stefan Boltzman law from Plank's law. **[8]**

c) The effective temperature of a body having an area of 0.12m^2 is 527°C. **[8]**

Calculate;

i) The total rate of energy emission

ii) The intensity of normal radiation

iii) The wavelength of maximum monochromatic emissive power

Q6) a) Draw the temperature distribution curve for following heat exchangers (any 3) **[6]**

i) Counter flow heat Exchanger

ii) Evaporator

iii) Parallel flow heat Exchanger

iv) Condenser

b) What are the design considerations of heat exchangers? **[6]**

c) The flow rates of hot and cold water streams running through a parallel flow heat exchanger are 0.2kg/s and 0.5kg/s respectively. The inlet temperatures of hot and cold sides are 75°C and 20°C respectively. The exit temperature of hot water is 45°C. If overall heat transfer coefficient is 325 W/m^{20}C, calculated the area of heat exchanger. Assume C_p of water 4.187 kJ/kgK. **[6]**

✈ ✈ ✈

b) The crank and the connecting rod of a 4 - cylinder in-line engine running at 1800 r.p.m. are 60 mm and 240 mm each respectively and the cylinders are spaced 150 mm apart. If the cylinders are numbered 1 to 4 in sequence from one end, the cranks appear at intervals of 90° in an end view in the order 1 - 4 - 2 - 3. The reciprocating mass corresponding to each cylinder is 1.5 kg. Determine:

i) Unbalanced primary and secondary forces, if any, and

ii) Unbalanced primary and secondary couples with reference to central plane of the engine. **[12]**

Q6) a) Derive expression for energy stored in a flywheel. **[6]**

b) A single cylinder double acting steam engine develops 150 kW at a mean speed of 80 rpm.The coefficient of fluctuation of energy is 0.1 and the fluctuation of speed is ± 2% of mean speed. If the mean diameter of the flywheel rim is 2 metre and the hub and spokes provide 5 % of the rotational inertia of the flywheel, find the mass and cross-sectional area of the flywheel rim. Assume the density of the flywheel material as 7200 kg/m^3. **[10]**

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Total No. of Pages :4

T.E. (Mechanical Engineering) (Part - III) (Semester - V) (Revised) Examination, November - 2017
THEORY OF MACHINES - II
Sub. Code: 66242

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume if necessary suitable data and state clearly.**
5) **Use of Non programmable calculator is permitted.**

Q1) a) Give the classification of Toothed Gearing and define the following terms.

i) Addendum.

ii) Module. **[8]**

OR

Derive the expression for the velocity of sliding between pair of involute teeth and define the terms.

i) PitchCircle.

ii) Diametral Pitch.

b) A pair of Spur gears with involute teeth is to give a gear ratio of 4 : 1. The arc of approach is not to less than the circular pitch and smaller wheel is the driver. The angle of pressure is 14.5°. Find

i) the least number of teeth that can be used on each wheel and

ii) the addendum of the wheel in terms of the circular pitch. **[10]**

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2) a) What are the various types of the torques in an epicyclic gear train. **[6]**

OR

Explain the concept of equivalent mass and moment of inertia applied for gear trains.

b) Fig. 2 b shows an epicyclic gear train with compound planets 'B - C', 'B' has 15 teeth and meshes with an annulus 'A' which has 60 teeth. 'C' has 20 teeth and meshes with the sunwheel 'D' which is fixed. The annulus is keyed to the propeller shaft 'Y' which rotates at 740 rad/s. The spider which carries the pins upon which the planets revolve is driven directly from main gear box by shaft 'X', this shaft being relatively free to rotate with respect to wheel 'D'. Find the speed of shaft 'X', when all the teeth have same module. When engine develops the 130 kW, what is the holding torque on the wheel 'D'? Assume 100 percent efficiency throughout. **[10]**

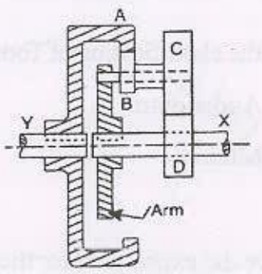


Fig. 2 b.

3) a) Condition for stability of two wheel vehicle moving in a curved path. **[6]**

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 rpm. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic couple in the following conditions.

i) The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.

ii) The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.

iii) The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern. **[10]**

4) a) Derive the equation for inertia torque analytically considering the effect of inertia of the connecting rod. **[6]**

OR

Derive an expression for velocity and acceleration of the slider of slider crank mechanism.

b) In a vertical double acting steam engine, the connecting rod is 4.5 times the crank. The weight of the reciprocating parts is 120 kg and the stroke of the piston is 440 mm. The engine runs at 250 rpm. If the net load on the piston due to steam pressure is 25 KN when the crank has turned through an angle of 120° from the top dead centre, determine the

i) thrust in the connecting rod.

ii) pressure on the slide bars.

iii) tangential force on the crank pin.

iv) thrust on the bearings.

v) turning moment on the crank shaft. **[10]**

5) a) Explain balancing of single rotating mass by two masses rotating in different planes. **[6]**

OR

Explain direct and reverse crank method for balancing of radial engine.

SUK-BCE

Q4) a) Sketch root locus plot for $G(S)\,H(S) = \dfrac{K}{S(S^2+6.S+12)}$. [12]

b) A unity feedback control system is having an open loop transfer function $G(S) = \dfrac{K(S+13)}{S(S+3)(S+7)}$. Determine the range of values of K for the system to be stable. [6]

Q5) a) Sketch the Bode plot for the transfer function $G(S) = \dfrac{1000}{S(1+0.1.S)(1+0.001.S)}$. Determine gain margin and phase margin. [10]

b) Calculate break in point and angle of departure for the control system, given by characteristic equation $S^2 + 2S + 3 + K(S+2) = 0$. [6]

Q6) a) The motion of a numerically controlled machine tool is described by the differential equation $\ddot{y} + 7.\dot{y} + 10.y = f(t)$. Determine computer diagram and state space representation using parallel method. [8]

b) The motion of robot arm controlled by an electric motor is given by the differential equation $\ddot{y} + 6.\dot{y} + 9.y = f(t)$. Use series programming to determine computer diagram. [8]

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Total No. of Pages : 4

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T.E. (Mechanical) (Semester - V) Examination, November - 2017

CONTROL ENGINEERING

Sub. Code : 66241

Day and Date : Thursday, 09 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right Indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

Q1) a) For the mechanical system shown in Fig. 1 a, prepare grounded chair representation and construct electrical circuit using force current analog. [6]

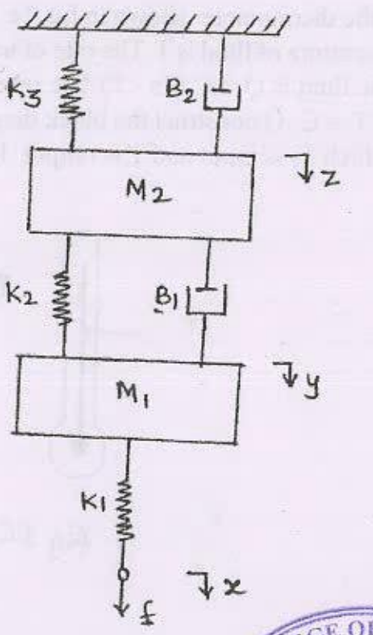


fig 1 a

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b) For the fluid system shown in Fig. 1b, determine equation of P1 in terms of P2 and P. [6]

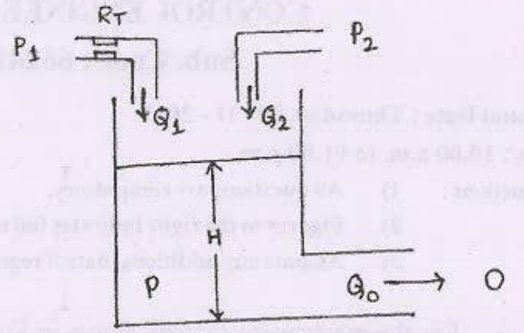


fig 1 b

c) For the thermometer shown in fig. 1c, the ambient temperature is Ts and temperature of fluid is T. The rate of heat flow from surrounding medium to the fluid is $Q = C_1(Ts - T)$ The rate of change of temperature of fluid is $D.T. = C_2.Q$ construct the block diagram representation for the system in which Ts is input and T is output. Determine time constant. [6]

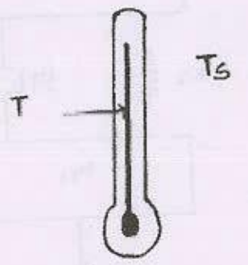


fig 1C

22) a) Determine linear approximation for the equation $Z = \sin X . \cos Y$ for $Xi = 60°$ and $Yi = 30°$, What is approximate value of Z when $X = 63°$ and $Y = 28°$. [8]

b) Reduce the block diagram shown in fig. 2b and obtain transfer function. [8]

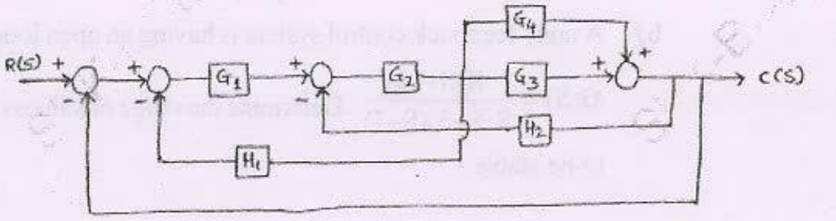


fig 2 b

23) a) A hydraulic control system is shown in fig. 3a. The forcing function is $r(t) = u(t)$ and all initial conditions are zero. Determine the response c(t) of system. [8]

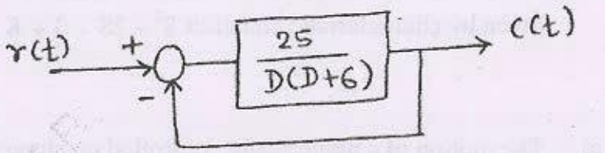


fig. 3 a

b) For the control system shown in fig. 3b, determine K_1, K_2 and a such that the system will have a steady state gain of 1, a natural frequency of 2 and damping ratio of 0.5. [8]

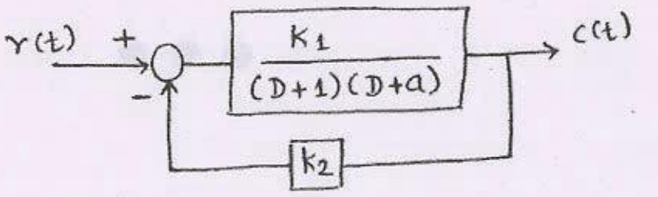


fig. 3 b

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T.E. (Mechanical Engg.) (Part - III) (Semester-VI) Examination, November - 2017

MACHINE DESIGN - II

Sub. Code : 66840

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat sketches whenever necessary.**
3) **Figures to the right indicate full marks.**
4) **Make suitable assumptions if necessary and state it clearly.**

SECTION-I

Q1) a) Define stress concentration. What are causes and remedies over stress concentration? **[8]**

OR

a) Explain the following terms in relation with design of component subjected to fluctuating loads:
   i) Endurance limit
   ii) Surface finish factor
   iii) Size factor
   iv) Notch sensitivity

b) A work cycle of a mechanical component subjected to completely reversed bending stresses consist of the following three elements: **[8]**
   i) $\pm$ 350 N/mm^2 for 85% of time
   ii) $\pm$ 400 N/mm^2 for 12% of time
   iii) $\pm$ 500 N/mm^2 for 3% of time

   The material for the component is 50C4 (S_{ut} = 660 N/mm^2) and the corrected endurance limit of the component is 280 N/mm^2. Determine the life of the component.

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Q2) a) Explain the following terms in connection with roller bearing, **[8]**

i) Static load capacity

ii) Dynamic load capacity

iii) Equivalent load capacity

iv) Load - life relationship

OR

a) Differentiate between static and dynamic capacity of the ball bearing. What is their significance in the selection of the bearings?

b) A deep-groove ball bearing having bore diameter of 60 mm and rotating at 1440 r.p.m. is subjected to radial force of 2500N and an axial force of 1200 N. The radial and thrust factors are 0.56 and 2.0 respectively. The load factor is 1.2. The expected rating life is 25,000 hrs. Calculate the required dynamic load capacity and select the bearing from manufacturer's catalogue given below in table no. 1. **[8]**

Table no.1

Principal Dimensions				Basic Capacity	
Bearing No.	Bore Dia 'd' mm	Outside Dia 'D'mm	Width 'B' mm	Static 'Co' kN	Dynamic 'C' kN
6012	60	95	18	23.20	29.60
6212	60	110	22	32.50	47.50
6312	60	130	31	52.00	81.90
6412	60	150	35	69.50	108.00

Q3) a) Explain the following terms in relation to sliding contact bearings, **[8]**

i) Length to diameter ratio

ii) Unit bearing pressure

iii) Radial Clearance

iv) Minimum film thickness

OR

a) With neat sketches, describe construction and working principles of hydrodynamic bearings.

b) The following data is given for a 360° hydrodynamic bearing. **[10]**

Radial load = 3.2kN

Journal speed = 1490 rpm

Journal diameter = 50 mm

Bearing length = 50 mm

Radial clearance =0.05 mm

Viscosity of lubricant = 25 cp

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate

i) Coefficient of friction

ii) Power lost in friction

iii) Minimum oil film thickness

iv) Flow requirement in litres/min

v) Temperature rise

Refer following data table:

l/d	ε	h_0/C	S	ϕ	(r/C)f	$Q/(rCn_sl)$
1	0.1	0.6	0.264	63.10	5.79	3.99
	0.6	0.4	0.121	50.58	3.22	4.33
	0.8	0.2	0.0446	36.24	1.70	4.62
	0.9	0.1	0.0188	26.45	1.05	4.74
	0.97	0.03	0.0047	15.47	0.514	4.82

SECTION - II

Q4) a) Explain different types of gear tooth failure. **[8]**

OR

a) Explain the force analysis in the design of spur gears.

b) It is required to design a pair of spur gears with 20° full-depth involute teeth consisting of a 20-teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW, 1450 rpm electric motor. The starting torque of the motor can be taken as 150% of the rated torque. The material of the pinion is plain carbon steel Fe410 (S_{ut} = 410 N/mm^2), while the gear is made of grey cast iron FG 200 (S_{ut} = 200 n/mm^2). The factor of safety is 1.5. Design the gears based on the Lewis equation and using velocity factor to account for the dynamic load. Lewis form factors for 20 and 50 teeth are 0.32 and 0.408 respectively. Assume pitch line velocity as 5 m/s. Recommended series of module: 7 or 9. **[8]**

Q5) a) Derive expression for wear strength of helical gears. **[8]**

OR

a) Explain with neat sketch the concept of virtual number of teeth and its significance in the design of helical gear.

b) A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and the normal pressure angle is 20°. The normal module is 3mm. Calculate **[10]**

i) The transverse module
ii) The transverse pressure angle
iii) The axial pitch
iv) The pitch circle diameters of the pinion and the gear
v) The centre distance and
vi) The addendum and dedendum circle diameter of the pinion

Q6) a) Explain with neat sketch the force analysis of bevel gear. **[8]**

OR

a) Explain the strength rating of worm gearing.

b) A pair of worm gears is designated as 1/30/10/8 Calculate **[8]**

i) The centre distance
ii) The speed reduction
iii) The dimensions of the worm and
iv) The dimensions of the worm wheel

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T.E. (Mechanical) (Part - III) (Semester - VI) (New) (Revised) Examination, November - 2017

INTERNAL COMBUSTION ENGINES

Sub. Code: 66841

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt all the questions.**

2) **Make suitable assumptions if necessary and clearly mention them.**

3) **Figure to right indicate full marks.**

Q1) a) Define the following terms **[8]**

i) Clearance volume.

ii) Swept volume.

iii) Thermal efficiency.

iv) Air standard efficiency.

OR

b) Classify IC Engine and explain each type with examples. **[8]**

c) Explain with neat sketch port timing diagram for two stroke petrol engine. **[8]**

Q2) a) A four cylinder, four stroke square engine running at 40 rev/sec has a carburetor venturi with a 3 cm throat. Assuming the bore to be 10 cm, volumetric efficiency of 75%, the density of air to be 1.15 kg/m^3 and coefficient of air flow to be 0.75. Calculate, **[9]**

i) Engine volume sucked per second and mass flow rate.

ii) Suction pressure at throat.

b) Explain the following terms. **[9]**

i) Air fuel ratio and its types.

ii) Air fuel requirements for SI engine.

iii) Petrol injection in SI engine.

OR

c) Explain the injection nozzles used in CI engine and its types. **[9]**

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Q3) a) Write types of combustion chamber for SI engine and explain requirements of Combustion chamber. **[8]**

OR

b) Explain the factors influenced of engine variable on flame speed. **[8]**

c) Explain the effect of various engine variables on detonation. **[8]**

Q4) a) What modification is required, if the existing engine is to be supercharged? What are various methods of turbo charging? **[8]**

b) Explain with figure abnormal combustion in CI engine. Discuss for the control of knocking for CI engine. **[8]**

Q5) a) Discuss the various pollution norms and devices used for the control of engine emissions. **[8]**

b) What do you mean by induction swirl in combustion chamber of C I Engines? Discuss the advantages and disadvantages of the induction swirl. **[8]**

OR

b) What are the different methods to measure frictional power of ic engines. Explain Morse test. **[8]**

Q6) a) List the advanatges and disadvantages of supercharging of diesel engine. **[7]**

OR

a) Describe the sources for the production of Biodiesel and its advantages for utilization in IC engines. **[7]**

b) A four stroke petrol engine develops 50 kW and consumes 16 liters of petrol per hour of specific gravity 0.755. The calorific value of fuel used is 44500kJ/kg. Find its indicated thermal efficiency. If engine runs at 3000 rpm. It develops the mean effective pressure of 5.2 bar. Determine the bore and length of stroke if stroke length is 1.1X bore. **[7]**

c) Write notes on HC Emission and their control. **[4]**

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Seat No.	

Total No. of Pages : 3

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

MACHINE TOOLS & PROCESSES

Sub. Code : 63364

Day and Date : Tuesday, 07 - 11 - 2017

Time : 10.00 a.m. to 01.00 p.m. **Total Marks : 100**

Instructions : 1) All Questions are compulsory.

2) Figures to the right indicate full marks

3) Assume suitable data, if necessary.

4) Use of Non-programmable Scientific Calculator is allowed.

Q1) Attempt any four (4 marks each) :

a) Explain the properties of molding sand . Suggest the methods to measure the same. [4]

b) State the function of riser in the gating system. [4]

c) What are the steps involved in gravity die casting. [4]

d) Draw neat sketch of cupola furnace and name the parts. [4]

e) List the defects related to molding process? Explain any two of them. [4]

Q2) Attempt any four (4 marks each) .

a) Briefly explain principle of rolling with neat sketch. [4]

b) Distinguish between open and closed die forging processes. [4]

c) Show by schematic sketches the process of forward extrusion. Give two examples of components produced by extrusion. [4]

d) Why is lubrication difficult in wire drawing process? State the methods generally employed in it. [4]

e) Indicate by means of flow diagram the different stages in manufacture of 50 mm diameter rod from a steel ingot. [4]

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Q3) Write a short note on (Any Three) :

a) Advantages and Limitations of sand casting process [6]

b) Defects in forging [6]

c) Injection molding [6]

d) Thermoforming process for plastic [6]

Q4) Attempt any four (4 marks each)

a) A lathe is provided with a change gear set from 20 to 125 teeth in steps of 5 teeth and an additional gear of 127 teeth. Find the gear train for cutting metric thread of 3 mm pitch on a lathe having lead screw pitch as 6 TPI. [4]

b) How are a capstan and turret lathe headstock classified? Describe any one of them. [4]

c) Describe in brief working principle of boring machine. [4]

d) Draw neat sketch of following operations performed on drilling machine. [4]

i) Countersinking

ii) Counterboring

e) Give the specification of lathe. [4]

Q5) Attempt any four (4 marks each) :

a) Explain the method of carrying out an operation on shaper. [4]

b) Outline the procedure of planning vertical surfaces. [4]

c) Make a neat sketch of Universal milling machine. State its advantages. [4]

d) What are various tool holding devices used on milling machine? [4]

e) Compare the gear shaving with gear rolling. [4]

Q6) Write a short note on (Any Three) :

a) Abrasive Jet Machining advantages & limitations [6]

b) Application of Electro- Chemical machining with neat sketch [6]

c) Water jet machining process [6]

d) Various operations performed on milling machine [6]

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester-IV) (Revised) Examination, November - 2017

THEORY OF MACHINES - I

Sub. Code : 63363

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **Attempt all questions.**
2) **Figures to the right indicates full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume suitable data, if necessary and state clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) a) Write a note on Grubler's criterion for planar mechanism. **[8]**

OR

a) Explain the inversions of single-slider crank chain with neat sketches. **[8]**

b) A reciprocating engine mechanism is shown in fig.1.b. Crank OC is 60 mm long and connecting rod CP is having length of 180mm. By using Klein's construction method, find the velocity and acceleration of the piston if the crank is rotating at 180 r.p.m. **[8]**

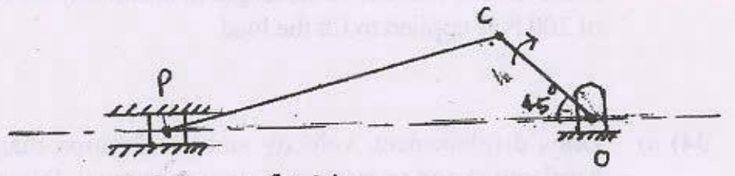


fig.1.b

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Q2) Crank OA of the quick return mechanism shown in fig. 2. revolves at a uniform speed of 250 r.p.m. in clockwise direction. The dimensions of various links are: OA = 75 mm, PQ = 375 mm, and QR = 400 mm. Crank makes 45° with vertical line PO. Find: i) velocity of R, ii) acceleration of R and iii) angular acceleration of QR. **[18]**

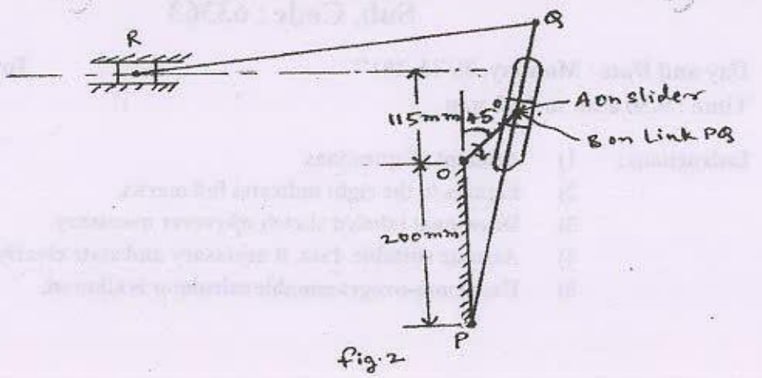


fig. 2

Q3) a) Derive the equation for friction torque in case of conical pivot bearing assuming uniform pressure with usual notations. **[8]**

OR

a) Derive the equation for friction torque in case of flat pivot bearing assuming uniform pressure condition. **[8]**

b) A screw jack has square threaded screw with mean diameter of 40 mm. The pitch of the thread is 6 mm and the coefficient of friction at the screw is 0.16. The load to be lifted is 25 kN and is supported by a collar having mean diameter of 50 mm and the coefficient of friction at the collar is 0.18. Determine the length of the tommy bar required if an effort of 200 N is applied to lift the load. **[8]**

Q4) a) Draw displacement, velocity and acceleration diagram for Uniform acceleration and retardation motion program of follower. **[4]**

b) A cam is operating an oscillating roller follower having SHM during outward and return stroke. Draw the cam profile for the following given data;

Distance of roller centre from cam centre at the start of ascent = 60 mm;

Follower arm length = 80 mm; Distance of pivot point from cam centre = 100 mm;

Angle of ascent = 60°; Angle of descent = 90°; Angle of dwell in between = 45°

Angle of oscillation of follower arm during ascent and descent = 15° **[14]**

Q5) a) Derive the equation of ratios of belt tensions in case of flat belt drive. **[6]**

OR

a) Explain slip and creep in belt. **[6]**

b) An open belt running over two pulleys 240 mm and 600 mm diameter connects two parallel shafts 3m apart and transmits 4 kW from smaller pulley that rotates at 300 rpm. Coefficient of friction between the belt and pulley is 0.3 and safe working tension is 10 N per mm width. Determine minimum width of belt, initial tension in belt. **[10]**

Q6) a) Explain controlling force and controlling curve. **[6]**

OR

a) Explain the terms height of governor, Isochronism and stability related to governor. **[6]**

b) In a porter governor, each of the four arms is 400 mm long. The upper arms are pivoted on the axis of rotation whereas the lower arms are attached to the sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and the load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of 250 mm and 300 mm of rotation of governor balls? **[10]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Seat No. [ ]

Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

ii) Discharge through nozzle = 0.18 m^3/s

iii) Area of the jet = 7500 mm^2

iv) Power available at the shaft = 44 kW

v) Mechanical efficiency = 94%

Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Seat No. [ ]

Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

ii) Discharge through nozzle = 0.18 m^3/s

iii) Area of the jet = 7500 mm^2

iv) Power available at the shaft = 44 kW

v) Mechanical efficiency = 94%

Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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Q2) a) What is governing of turbine? Explain governing of Francis turbine with neat sketch. [8]

b) An inward flow reaction turbine has outer diameter of 1m and inner diameter 0.5m. The vanes are radial at the inlet and discharge is radial at the outlet. Water enters vane at an angle of 10°. Assuming velocity of flow to be constant at 3m/sec. Find speed of the wheel and vane angle at outlet. [8]

OR

c) A Kaplan turbine works under head of 16m. Runner diameter is 2.5 times diameter of hub; speed of turbine is 105 rpm. Angle of vane tip at outlet extreme edge is 20° and K_f=0.6. [8]

Assume radial discharge.

Calculate i) Runner diameter

ii) Hub diameter

iii) Discharge through turbine

Q3) a) Define specific speed of pump and obtain expression of it. What is significance of it? [8]

b) Write short notes (any two) [10]

i) Priming and its necessity

ii) NPSH

iii) Derive expression for minimum starting speed of centrifugal pump.

OR

c) i) A centrifugal pump is running at 1000 rpm. The outlet vane angle of impeller is 45° and velocity of flow at out 2.5 m/sec. Discharge through pumps is 200 lit/sec working against total head of 20m. If manometric efficiency is 80%, find impeller diameter and width of impeller at outlet. [5]

ii) Centrifugal pump of impeller diameter 0.30m discharging 0.03 m^3/s water against a total head of 15 m and the pump is running at 1000 rpm. Find the discharge, head and ratio of power of a geometrically similar pump of diameter 0.15 m when it is running at 2500 rpm. [5]

Q4) a) Prove that the expression for volumetric efficiency in reciprocating compressor with effect of clearance volume is

$$n_v = 1 - \frac{V_C}{V_S}\left[\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} - 1\right]$$

Where,

V_c is Clearance volume, V_s is swept volume and P_2/P_1 is the pressure ratio. Also discuss the effect of Clearance ratio on the volumetric efficiency of the compressor. [8]

b) Write short notes on any two: [10]

i) Requirement of multistage of reciprocating compressors.

ii) Workdone by reciprocating compressor during adiabatic and isothermal compressions.

iii) Classification of reciprocating compressors.

OR

b) i) A single acting single stage compressor is belt driven from an electric motor at 400 rpm. The cylinder diameter is 15cm and the stroke 17.5 cm. The air is compressed from 1 bar to 7 bar and the law of compression $PV^{1.3}$ = Constant. Find the power of the motor, if transmission efficiency is 97% and the mechanical efficiency of compressor is 90%. Neglect clearance effect. [5]

ii) The pressure in the mains of compressor air service is to be 8 bar and a supply of 28 m^3/hr at 15°C and that pressure is to be maintained. The air is compressed from an initial pressure 1 bar by a two stage compressor in which the compression is adiabatic. The air is cooled to its initial temperature of 15°C in the inter cooler. What is the minimum power required to compress the air? Take R = 287 J/kgK. [5]

Q5) a) Explain the concept of Slip factor and Power input factor. [8]

b) A Centrifugal compressor delivers 40 kg of air per minute at a pressure of 3 bar and 120° C. The intake pressure and temperature of the air is 1 bar and 25°C. If no heat loss to the surrounding, find

i) Index of compression

ii) Power required, if the compression is isothermal

(Take R = 287 J/kgK and C_p = 1.005 J/kgK) [8]

OR

b) A cantilever of length 2 m carries a UDL of 2 kN/m over a length of 1 m from the free end and a point load of 1kN at the free end. Find the slope and deflection at the free end if $E=2.1\times10^5 N/mm^2$ and $I=6.667\times10^7 mm^4$ **[8]**

OR

b) State the importance of theories of failure and explain the maximum Principal stress theory. **[8]**

Q6) a) State the assumptions made in Euler's column theory and derive its expression for the crippling load when both the ends of the column are hinged. **[8]**

b) The maximum stress produced by pull in bar of length 1m is 150 N/mm^2. The area of cross sections and lengths are as shown in fig.5. Calculate the strain energy stored in a bar if $E=2\times10^5 N/mm^2$ **[8]**

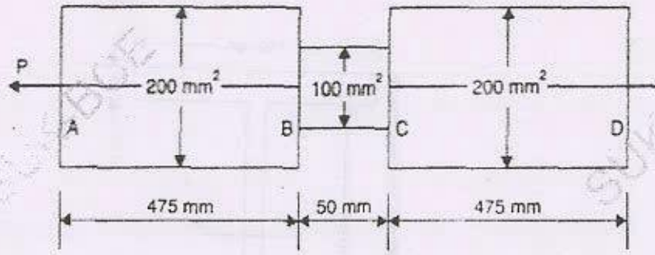


Fig. 5

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Total No. of Pages :4

Seat No.

S.E. (Mechanical) (Semester - IV) Examination, November - 2017
ANALYSIS OF MECHANICAL ELEMENTS
Sub. Code:63361

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary and state it clearly.**
3) **Figures to the right indicate full marks.**
4) **Draw neat and labeled sketches wherever necessary.**
5) **Use of non programmable calculator is allowed.**

Q1) a) Three pillars two of aluminum and one of steel support a rigid platform of 200 kN as shown in the fig.1. If area of each aluminum pillar is 1000 mm^2 and that of steel pillar is 800mm^2, find the stresses developed in each pillar.

Take$E_a = 1\times10^5 N/mm^2$ and $E_s = 2\times10^5 N/mm^2$. What additional load P, can it take, if working stresses are 65N/mm^2 in aluminum and 150N/mm^2 in steel? **[12]**

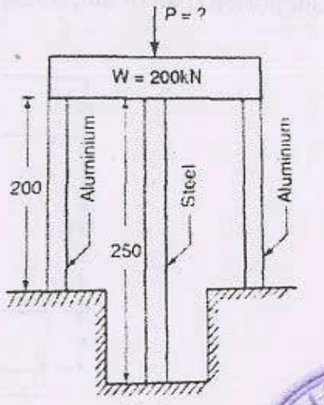


Fig.1

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b) Explain thermal stresses and hence derive the expression for thermal stress induced in a bar with its ends fixed by rigid support. **[6]**

OR

b) A hollow circular shaft 200 mm external diameter and thickness 25mm is transmitting power at 200 rpm. The angle of twist over the length of 2m was found to be 0.5°. Calculate the power transmitted and the maximum shear stress induced in the shaft. Take modulus of rigidity as 84 kN/mm² **[6]**

2) Draw SFD and BMD for loading condition shown in fig 2. Locate point of contraflecture and maximum bending moment if any. **[16]**

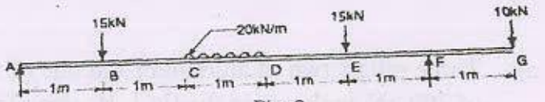


Fig. 2

)3) A cast iron beam has I section with top flange 80 mm ×40 mm, wed 120 mm ×20mm and bottom flange 160 mm×40 mm. as shown in Fig 3 if tensile stress is not to exceed 30 N/mm² and compressive stress 90N/ mm²,what is the maximum UDL the beam can carry over a simply supported span of 6m, if larger flange is in tension.

16]

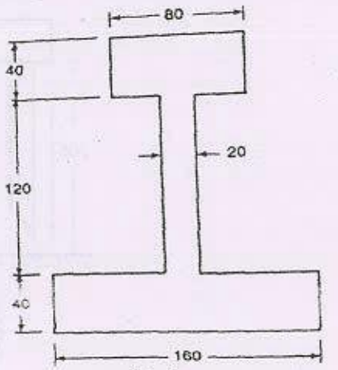


Fig. 3

4)a) Derive the expression for the principal stresses and the maximum shear stress for a member subjected to simple shear stress. Show the locations of Principal Planes and Planes of Maximum shear stress. **[9]**

b) At a point in a strained material the principal stresses are 140N/mm² (tensile) and 60 N/mm² (compressive). Determine the normal stress, shear stress and the resultant stress on a plane inclined at 45°to axis of major Principal stress. What is the intensity of maximum shear stress at the point? **[9]**

OR

b) An I-section beam 350mm ×150mm has a wed thickness of 10mm and a flange thickness of 20mm.(Fig.4) If the shear force acting on the section is 40 kN, find the maximum shear stress developed in the I-section. Also sketch the shear stress distribution across the section. **[9]**

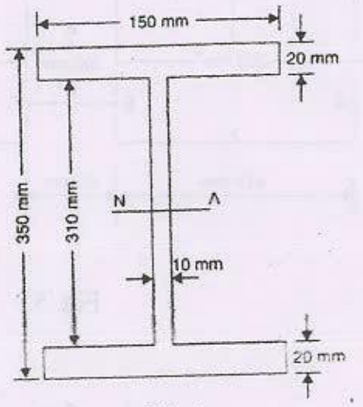


Fig.4

Q5) a) Derive the expression for slope and deflection of a simply supported beam subjected to an UDL for the whole span, using double integration method. **[8]**

Seat No.

S.E. (Mechanical Engineering) (Semester - III) (Revised)
Examination, November - 2017
FLUID MECHANICS
Sub. Code : 63354

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Neat diagrams must be drawn wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of non programmable calculator is allowed.**
5) **Assume suitable data if necessary.**

Q1) a) Define viscosity, surface tension and capillarity and write their units in S.I. system. **[6]**

b) A thin square plate 1m × 1m is placed horizontally at the centre in a horizontal gap of height 2 cm filled with oil of viscosity 10 poise. The plate is pulled at a constant velocity of 0.1 m/s. Find the force on the plate.

If the gap is now filled with another oil. When the plate is placed at a distance of 0.5 cm from one of the surfaces of the gap and pulled with the same velocity, if the force on the plate remains same as before, find the viscosity of the new oil. **[6]**

c) Define Buoyancy and meta centre. **[4]**

Q2) a) Distinguish by giving examples, Laminar and Turbulent flow, Steady and Unsteady flow, Uniform and Non uniform flow and Compressible and Incompressible flow. **[8]**

b) Solve any one of the following : **[8]**

i) Find the value of a such that the flow field given by

$V = (axy - z^3)i + (a - 2)x^2j + (1 - a)xz^2k$ is irrotational.

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ii) An air plane flies at an altitude where the pressure and density of air are 40 KN/m² and 0.58 Kg/m³ respectively. If the stagnation pressure measured by a pitot tube is 57 KN/m², compute the speed of the aeroplane and the stagnation temperature and stagnation density. Take R = 287J/Kgk and ratio of specific heats is 1.4.

3) a) i) Bernoulli's theorem is based on which principle? Give its statement. Name three devices where Bernoulli's equation is applied. [4]

ii) Derive an expression for discharge over a triangular notch in terms of head of liquid over the crest of the notch and the included angle. [5]

b) Solve any one of the following : [9]

i) A venturimeter is used for the measurement of discharge of water in a horizontal pipeline. The pipe diameter is 20 cm and the throat diameter is 12 cm. When the flow of 130 lit/sec is flowing, the attached manometer shows a head difference of 50 cm if the coefficient of discharge of the venturimeter is 0.98 find the density of manometric fluid in the manometer.

ii) A circular tank of diameter 3 mt contains water up to a height of 4 mt. If the water is discharged through a 10 cm diameter orifice at the bottom of the tank, find the height of water above the orifice after 5 minutes Assume coefficient of discharge of orifice is 0.63.

4) a) i) Discuss the applications of momentum equation. [4]

ii) Explain with a neat sketch how pitot tube is used to measure discharge through pipe. [4]

b) An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drop in 100 mt. length of the pipe is 1800 KN/m² determine [8]

i) Wall shear stress and frictional drag for 100 mt. length.

ii) Power required to maintain the flow.

iii) The velocity gradient at the pipe wall.

iv) The velocity and shear stress at 8 mm from the wall.

5) a) i) Explain the concept of equivalent pipe. [5]

ii) Discuss the causes of minor energy losses in flow through pipes. [4]

b) Solve any one of the following : [9]

i) Three pipes of diameters 30 cm, 20 cm and 40 cm and lengths 450 mt, 255 mt and 315 mt respectively are connected in series. The difference in water surface levels in two tanks is 18 mt. Determine the rate of flow of water if coefficients of friction are 0.0075, 0.0078 and 0.0072 respectively considering

A) Minor losses also B) Neglecting minor losses.

ii) A horizontal pipe line 15 cm in diameter is joined by sudden enlargement to 25 cm diameter pipe. Measurements indicate that when flow is from smaller to larger cross section the head loss is 0.5 mt in excess of that when the flow takes place from larger to smaller section. Determine flow rate. Take coefficient of contraction $C_c = 0.63$.

6) a) What do you mean by boundary layer separation? Why does it occur? With neat sketches explain the methods used to control the separation of boundary layer. [8]

b) Solve any one of the following : [8]

i) A geometrically similar model of an air duct is built to 1 : 25 scale and tested with water which is 50 times more viscous and 800 times denser than air. When tested under dynamically similar conditions the pressure drop is 2 bar in the model. Find the corresponding pressure drop in the full scale prototype.

ii) Define pressure drag and skin drag or shear drag. A 2.5 mt long body having a projected area of 2.4 m² normal to the direction of motion is having a viscosity of 0.0012 Ns/m². Find the drag on the body if it has drag coefficient of 0.45 for Reynolds number of 7×10^6.

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SF-80

Total No. of Pages : 3

Seat No.	

S.E. (Mech) (Part - II) (Semester-III) (Revised)
Examination, November - 2017
METALLURGY
Sub. Code : 63353

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any three questions from each section.**
2) **Answers for both sections to be written in the same answer book.**
3) **Figures to the right indicate full marks.**
4) **Draw neat figures wherever necessary.**

SECTION-I

Q1) Answer any three of the following. Each question carries equal marks. **[18]**

a) With neat sketches. Explain the process of Solidification by nucleation, crystallization and growth.

b) Explain the phenomenon of coring using equilibrium diagram? How can be cored structures avoided or eliminated?

c) Draw a typical equilibrium diagram for impure/ partial eutectic systems and explain the cooling and solidification of any hypoeutectic alloy from above melting temperature to room temperature and draw the room temperature structure.

d) Draw the crystal structures of BCC and FCC and evaluate the number of atoms per unit cell for both.

Q2) a) Draw Fe-Fe_3C equilibrium diagram. Indicate all the phases. Temperatures and Compositions. **[8]**

b) What is SG Iron? Explain the process of manufacturing SG Iron. Draw the microstructure of SG iron and Gray Cast iron and compare their properties. **[8]**

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Q3) a) Draw typical equilibrium diagram of A1-Cu alloy system? Explain the process of precipitation hardening treatment and its effects. Write the applications. [7]

b) Draw self explanatory sketches of any three. [9]

i) Substitutional and interstitial type solid solution.

ii) Microstructure of white and malleable cast irons.

iii) Microstructure of 0.4 and 1.2% carbon steel .

iv) Microstructure of 70:30 brass as cast and annealed

v) X-ray Radiography.

vi) SN curve and Creep curve.

Q4) Write short notes on any four. [16]

a) Solid solutions.

b) Tool steels.

c) Ferritic Stainless steels.

d) Dye Penetrant Testing.

e) Impact Testing.

SECTION-II

)5) a) Draw flowchart for carbide cutting tools manufactured by powder metallurgy techniques, why pre-sintering is necessary in such tools? [9]

b) Classify different types of heat treatment furnaces? Explain rotary hearth furnace with neat sketch? [9]

6) a) Explain precipitation in A1–Cu alloys with respect to composition, aging time and temperature, over-aging? [8]

b) Classify case carburizing methods? Explain pack carburizing with neat sketch. [8]

Q7) Differentiate clearly between any four of the following. [16]

a) Hardening and Tempering.

b) Flame and Induction hardening.

c) TTT and CCT curves.

d) Pearlite and ferrite.

e) Annealing and normalizing.

Q8) Write short notes on any four of the following. [16]

a) Liquid phase sintering.

b) Induction hardening.

c) heat treatment defects.

d) Bainitic transformation.

e) Self lubricating bearing.

✡ ✡ ✡

)6) a) Define the following as related to steam turbine. [8]

i) Speed ratio

ii) Blade velocity coefficient

iii) Diagram efficiency

iv) Stage efficiency

OR

Explain the pressure compounding of impulse turbine showing pressure and velocity variations along the axis of the turbine.

b) The following particulars refer to a stage of a Parson's turbine comprising one ring of fixed blades and one ring of moving blades.

Mean diam. of blade ring = 70 cm

Speed of turbine = 3000 rpm

Steam velocity at exit from blade = 160 m/s

Blade outlet angle = 20°

Steam flow rate = 7 kg/s

Draw velocity diagram & find

i) Blade inlet angle

ii) Tangential force

iii) Power developed

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Total No. of Pages : 4

Seat No.

S.E. (Mech.) (Part - II) (Semester - III) Examination, November - 2017

APPLIED THERMODYNAMICS

Sub. Code: 63352

)ay and Date :Wednesday, 15 - 11- 2017 Total Marks : 100

'ime :10.00 a.m. to 1.00 p.m.

nstructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Draw neat sketch wherever necessary.
5) Use of steam table, mollier chart and non-programmable calculator is allowed.

)1) a) State and prove Carnot Principle. [8]

OR

b) Prove that Entropy of an isolated system during a process always increases. [8]

c) An insulated cylinder of volume capacity 4 m^3 contains 20 kg of nitrogen. Paddle work is done on the gas by stirring it till the pressure in the vessel gets increased from 4 bar to 8 bar. Determine change in entropy. Take for nitrogen C_p = 1.04 kJ/kgK and C_v = 0.7432 kJ/kgK. [8]

Q2) a) Write a note on steam tables and Mollier chart. [8]

OR

b) Write a note on Reheat and Regenerative steam power cycles. [8]

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c) A steam turbine receives steam at a pressure of 20 bar and superheated to 87.6°C. The exhaust pressure is 0.07 bar and the expansion of steam takes place isentropically. Calculate following using steam table **[10]**

i) Heat supplied

ii) Heat rejected

iii) Net work done

iv) Thermal efficiency

v) SSC.

3) a) Classify boilers. Compare water tube boilers with fire tube boilers. **[8]**

OR

b) What is function of air pump in condenser? Explain with neat sketch working of Edward's air pump. **[8]**

c) A prime mover uses 15,000 kg of steam per hour develops 2450 kW. The steam is supplied at 30 bar and 350°C. The exhaust from the prime mover is condensed at 725 mm of Hg when barometer reads 755 mm of Hg. The condensate temperature from the condenser is 31°C and the rise in circulating water temperature is 10°C. Determine: **[8]**

i) The quality of steam entering the condenser.

ii) The quantity of circulating water required.

iii) Cooling ratio.

Assume that no air is present in the condenser.

4) a) What is the function of the nozzle? Describe different types of steam nozzles with suitable sketch. **[8]**

OR

b) Explain the terms, degree of under cooling and degree of super saturation. What are the effects of supersaturation? **[8]**

c) Steam at a pressure of 15 bar and dryness fraction 0.97 is discharged through a convergent- divergent nozzle to a back pressure of 0.2 bar. The mass flow rate is 9 kg/kwh. If the power developed is 220 kW. Determine **[8]**

i) Throat pressure.

ii) Number of nozzles required if each nozzle has a throat of rectangular cross section of 4 mm × 8 mm.

5) a) Classify the turbines and compare impulse turbine with reaction turbine. **[8]**

b) A impulse turbine has exit steam velocity from a nozzle equal to 900 m/s. The nozzle makes an angle of 20° to the tangent of the rotating wheel. The main blade speed is 300 m/s. The blades are equiangular. The mass of steam flowing through the turbine is 1200 kg/hr. Calculate **[9]**

i) The blade angles.

ii) The blade efficiency.

iii) The power developed.

Take blade velocity co-efficient = 0.85.

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SF-78

Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Semester - III)
Examination, November - 2017
ELECTRICAL TECHNOLOGY
Sub. Code : 63351

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate marks.**
3) **Draw neat figures wherever necessary**
4) **Assume suitable data, if missing. State it clearly.**

SECTION - I

Q1) a) Derive the expression for speed and torque of dc motor. **[1 × 8]**

OR

Draw circuit diagrams and torque speed characteristics of dc shunt motor, dc series motor and dc cumulative compound motor.

Answer any two of the following (b, c, d). **[2 × 6]**

b) Draw the diagram and explain the working of 4 point starter.

c) Explain the basic methods of electric braking of dc motor.

d) A DC series motor runs at 1200 rpm driving a constant torque load by taking 10 A current from 200V supply. Now 5 ohm resistance is connected in series with the motor. Find the new armature current and new speed. The armature resistance is 0.6 ohm. Field resistance is 0.5 ohm.

Q2) Answer any TWO **[2 × 8]**

a) State three advantages of using 3 phase induction motor rather than dc motor. Describe the construction of cage type rotor.

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b) Torque of 3 phase induction motor is given by $\frac{120\, s\, E_2^2\, R_2}{2\pi N_s \left(R_2^2 + S^2\, X_2^2\right)}$

where E_2 ,R_2, X_2 , s, N_s are rotor induced emf per phase at standstill, Rotor resistance per phase, Rotor reactance per phase at standstill, slip and synchronous speed respectively. Write the value of slip and expression for torque at

i) Starting

ii) When the torque is maximum

iii) If rotor speed=Synchronus speed.

c) A 4 pole, 230V, 50Hz, 3 phase induction motor draws 10A at ( ) pf while running at 1450rpm. The stator loss is 100W, frictional loss is 100W. Find the rotor Cu loss. Neglect the rotor iron loss and find efficiency of the motor.

Q3) Answer any TWO **[2 × 8]**

a) Why DOL starter should be used for small rating motors? Describe DOL starter for 3 phase induction motor.

b) Describe rotor side speed control methods of 3 phase induction motor.

c) Explain the 'constant v/f' speed control method. Why it is the most popular method these days?

SECTION - II

Q4) Answer any TWO **[2 × 8]**

a) What are the desirable properties of servo motor? Describe methods of controlling dc servo motor.

b) Describe a linear induction motor. State its applications.

c) State advantages of brushless dc motor over conventional de motor. How is commutation obtained in BLDC motor?

Q5) Answer any TWO **[2 × 8]**

a) Explain the factors to be considered for selecting a motor for a particular drive.

b) Explain with examples the terms- active load, passive load, multimotor drive.

c) Classify mechanical loads based on how the torque requirement changes with driving speed. Explain.

Q6) Answer any TWO **[2 × 8]**

a) Compare direct arc type furnace with indirect arc furnace in all aspects.

b) Describe the set up and operation for eddy current heat treatment of metallic parts.

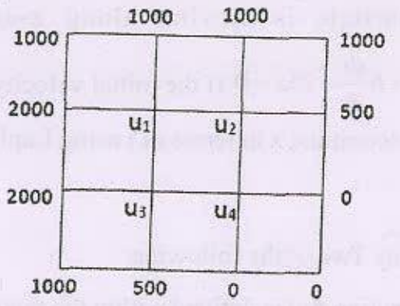
c) A 200 kW resistance oven is to be operated in such a way that its maximum temperature is not to exceed 1700°C. The initial temperature of the charge is 420°C. If heating element is a wire of diameter 0.6 cm is used, find the length required. Also find resistance of heating element.

Radiating efficiency =0.5, Emissivity = 0.5, Specific resistance of heating element= 150×10^{-6} ohm-cm.

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iv) $u(x, \infty)$ is finite

b) Solve the Laplace equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown in figure by Gauss-Siedal iterative method by per. [16]



Total No. of Pages : 4

Seat No.

S.E. (Mechanical Engg.) (Semester - III) (Revised) Examination, November - 2017

ENGINEERING MATHEMATICS - III

Sub. Code : 63350

Day and Date : Friday, 10 - 11 - 2017 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.
4) Assume suitable data if necessary.

SECTION - I

Q1) Attempt any Three of the following.

a) Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 3\sin x + 4\cos x$ with $y(0) = 1$ and $y'(0) = 0$. [6]

b) Solve $(D^2 + D+1)y = (1- e^x)^2$ [6]

c) Solve $(D^2 +5D + 4)\, y = 3 - 2x$ [6]

d) Solve $x^2\frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = e^x$. [6]

Q2) Attempt any one of the following.

a) The whirling speed of a shaft of length l is given by $\frac{d^4y}{dx^4} - a^4y = 0$,

where $a^4 = \frac{Ww^2}{gEI}$ and y is the displacement at distance x from one end. If the ends of the shafts are considered in long bearing so that the slope at each end is zero, show that the shaft will whirl when cos al cosh al =1. [16]

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b) i) The motion of particle is given by $\frac{d^2s}{dt^2}+k^2\frac{ds}{dt}=0$. At $t = 0$, $s=s_0$ and $\frac{ds}{dt}=v_0$ show that as time $t\to\infty, s=s_0+\frac{v_0}{k^2}$ **[8]**

ii) A spring for which stiffness K = 700 Newton / m hangs in a vertical position with its upper end fixed. A mass of 7 kg is attached to the lower end. After coming to rest, the mass is pulled down to 0.05 m and released Discuss the resulting motion of the mass, neglecting air resistance. **[8]**

Q3) Attempt any two of the following.

a) If $\vec{a}$ is a constant vector, $\vec{r}=x\vec{i}+y\vec{j}+z\vec{k}$ and $r=\sqrt{x^2+y^2+z^2}$ then find

i) $\nabla.\left(\frac{\vec{a}\times\vec{r}}{r}\right)$ and show that ii) $\nabla r^n=nr^{n-2}\vec{r}$ **[8]**

b) Show that $\vec{F}=(z^2+2x+3y)\vec{i}+(3x+2y+z)\vec{j}+(y+2xz)\vec{k}$ is irrotational but not solenoidal and hence find scalar potential **[8]**

c) Find the directional derivative of $\phi=x^2+2y^2-3z^2$ at (1, 2, 1) in the direction **[8]**

i) Normal to $xy^2+yz^3=4$ at (1, –1, 1)

ii) tangent to $x=t^2+t, y=2t, z=2-t$ at $t=1$

SECTION - II

Q4) Attempt any three from the following:

a) Find the Laplace transform of $\frac{d}{dt}\left(\frac{\sin t}{t}\right)$ **[6]**

b) Find $L\left\{\int_0^t x\cosh x dx\right\}$ **[6]**

c) Find inverse Laplace transform of $\log\left(1+\frac{a^2}{s^2}\right)$ **[6]**

d) A particle is moving along x-axis according to the law $\frac{d^2x}{dt^2}+6\frac{dx}{dt}+25x=0$. If the initial velocity is 12 meters per second to the left, determine x in terms of t using Laplace transform method. **[6]**

Q5) Attempt any Two of the following:

a) A function $f(x)$ is defined within the range $(0, 2\pi)$ as **[8]**

$$f(x)=\begin{cases}x & \text{if } 0<x<\pi\\ 2\pi-x & \text{if } \pi<x<2\pi\end{cases}$$

Express f(x) as a Fourier series in the range $(0, 2\pi)$

b) Find Fourier series with period 3 to represent $f(x) = 2x - x^2$ in the range $(0, 3)$ **[8]**

c) Find half range cosine series for $f(x) = \sin x$ in the range $(0, \pi)$ and hence deduce that $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots\ldots=\frac{\pi}{4}$. **[8]**

Q6) Attempt any one from the following.

a) Solve $\frac{\partial u}{\partial t}=a^2\frac{\partial^2 u}{\partial x^2}$ if $u(x, t)$ satisfies the following conditions. **[16]**

i) $u(0, t) = 0$ for all t

ii) $u(l, t) = 0$ for all t

iii) $u(x,0)=\begin{cases}x & \text{if } 0\le x\le l/2\\ l-x & \text{if } l/2\le x\le l\end{cases}$

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Total No. of Pages : 2

Seat No.	

B.E. (E & Tc) (Semester-VIII) Examination, November - 2017
OPERATING SYSTEM (Elective - II)
Sub. Code : 67822

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are Compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume data wherever necessary.**

SECTION-I

Q1) Attempt any two: **[16]**

a) What is a bootloader and explain in detail?

b) Draw and explain complete set of process state transitions?

c) Explain semaphore. How mutual exclusion can be achieved using semaphore?

Q2) Attempt any two: **[16]**

a) How do you prevent deadlock in taking place.

b) Draw the static & dynamic components of a process.

c) Draw & briefly explain the block diagram of System Kernel?

Q3) Write short notes on any three: **[18]**

a) The logical format of executable file.

b) Deadlock and starvation.

c) System calls.

d) Messaging.

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SECTION-II

Q4) Attempt any two: [16]

a) Explain in detail dynamically partitioned memory allocation scheme?

b) Explain in detail interrupt driven I/O system.

c) Draw the block diagram of Unix system kernel? Explain File subsystem & process control block?

Q5) Attempt any two: [16]

a) List the different reasons or cases for which kernel has to swap process out? Explain swapping process out?

b) Explain real time systems.

c) Explain working of page stealer process.

Q6) Attempt any three: [18]

a) Allocation of frames.

b) Fragmentation.

c) Kernel I/O subsystem.

d) Page fault.



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Seat No.	

B.E. (E & TC) (Part - IV) (Semester - VII) (Old)
Examination, November - 2017
WIRELESS COMMUNICATION (Pre Rev)
Sub. Code : 47927

Day and Date : Monday, 13 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION - I

Q1) Attempt any two **[2 × 8 = 16]**

a) What is WLL? Explain in detail.

b) Explain the concept of frequency reuse.

c) Compare 2G and 3G wireless network.

Q2) Attempt any two **[2 × 8 = 16]**

a) Explain in detail two - ray ground reflection model.

b) Explain diffraction and scattering in mobile radio propagation.

c) Write a note on Fading effects due to Doppler spread.

Q3) Attempt any two **[2 × 9 = 18]**

a) Derive the equation for free space propagation model.

b) Explain Small - Scale multipath measurements.

c) Explain in detail Rayleigh & Ricean distribution.

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SECTION - II

Q4) Attempt any two **[2 × 8 = 16]**

a) Compare FDMA & TDMA.

b) Explain any two spread spectrum multiple access.

c) Discuss signalling system 7.

Q5) Attempt any two **[2 × 8 = 16]**

a) Explain Global System for mobile

b) Explain IEEE - 802.11 standards.

c) Explain DECT functional concept.

Q6) Write a note on any three **[3 × 6 = 18]**

a) Personal Communication Services.

b) ISDN

c) X.25 Protocol

d) Network access protocol.

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Total No. of Pages : 2

B.E. (E&TC) (Part -II) (Semester - VIII) Examination, November - 2017

MOBILE COMMUNICATION (Elective -II) (Pre-Revised) (Old)

Sub. Code : 49521

Day and Date :Monday, 06 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) Solve any two. **[16]**

a) Explain in detail HSCSD (High speed Net. Switched Data) in GSM.

b) Draw and explain dial-vp data connection in an analog cellular network.

c) What is meant of bine-tooth? Describe in detail bine-tooth technology

Q2) Solve any two. **[16]**

a) Draw and explain CDPD-Network architecture.

b) Explain FHSS and DSSS offered by IEEE 802.11.

c) Explain packet switched data services on cellular network.

Q3) Write notes on any three. **[18]**

a) Wireless ATM

b) IP packet delivery

c) Minimal encapsulation

d) Mobile and wireless devices

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SECTION - II

Q4) Solve any two. **[16]**

a) Explain TCP over 2.5/3G wireless network. What characteristics have to be considered and configuration parameters to adopt TCP?

b) How and why does I-TCP isolates problems on the wireless link? What are the main drawbacks of this solution?

c) Explain security services in wireless system.

Q5) Solve any two. **[16]**

a) Explain Transmission/Time out freezing and selective retransmission.

b) Draw WAP push architecture and explain various protocols used in Push architecture.

c) Explain with neat diagram WTLS secure session establishment and datagram transfer.

Q6) Write notes on any three. **[18]**

a) Advantages and disadvantages of VPN

b) File systems

c) Sync. ML.

d) W.W.W.

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Total No. of Pages : 2

Seat No.	

B. E. (Electronics & Telecommunication Engineering) (Semester - VII) Examination, November - 2017

EMBEDDED SYSTEM (Revised)

Sub. Code : 67629

Day and Date : Monday, 13 - 11 - 2017

Time : 02.30 p.m. to 05.30 p.m. **Total Marks : 100**

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Assume suitable data if necessary.

Q1) Attempt any two of the following : **[2 × 8 = 16]**

a) Draw and Explain Pin out diagram of PIC Microcontroller.

b) Explain with example Direct and Indirect addressing accessing in PIC Microcontroller.

c) Write assembly program to generate a square wave at RB1 pin with 50% duty cycle.

Q2) Attempt any two of the following : **[2 × 9 = 18]**

a) Draw and Explain Capture Mode of PIC16F877 also explain CCPxCON Register.

b) Draw and Explain block diagram of Timer 0 of PIC16F877 also explain OPTION register related to Timer 0.

c) Explain I^2C and SPI mode of serial communication in PIC16F877.

Q3) Attempt any two of the following : **[2 × 8 = 16]**

a) Define Embedded System and explain components of an Embedded System.

b) Explain embedded software development process and tools.

c) Discuss Hardware-Software design and co-design issues.

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Q4) Attempt any two of the following : **[2 × 8 = 16]**

a) Explain the RISC architecture design philosophy.

b) Explain the concept of pipeline in ARM7 along with example.

c) Explain various modes of operation of CPU in ARM7.

Q5) Attempt any two of the following : **[2 × 9 = 18]**

a) Write the features of timers in LPC2148. Also give the names and use of all SFR's required for configuring timer module in LPC2148.

b) Write an embedded C program for LPC2148 to toggle the LED's connected to pins P0.4 to P0.7 for five times.

c) Write the features of IO ports in LPC2148. Also give the names and use of all SFR's required for configuring IO ports in LPC2148.

Q6) Attempt any two of the following : **[2 × 8 = 16]**

a) Explain with pseudo code, the Round Robin software architecture.

b) What is Task? Draw and explain Task state diagram.

c) What is a re-entrant function, explain with example? Also list the precautions that must be taken while using semaphores.

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Total No. of Pages : 2

Seat No.	

B.E. (Electronics and Telecommunication) (Semester - VII) Examination, November - 2017

COMPUTER COMMUNICATION NETWORKS (New)

Sub. Code : 67630

Day and Date : Wednesday, 15 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions :
1) **All questions are compulsory**
2) **Figures to the right indicate full marks.**
3) **Draw diagrams wherever necessary.**
4) **Assume suitable data if necessary.**

SECTION - I

Q1) Attempt any TWO from THREE **[16]**

a) Compare OSI & TCP/IP reference model.

b) Explain categories of networks.

c) Explain different framing Methods in DLL?

Q2) Attempt any TWO from THREE **[16]**

a) Define Hamming Distance. Explain Hamming Code used as Error-Correcting Code.

b) Explain CSMA protocols.

c) Explain Go-back-N protocol.

Q3) Write note on any THREE **[18]**

a) Networking Devices

b) Modem standards.

c) Guided Media

d) HDLC frame format

e) Gigabit Ethernet

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SECTION - II

Q4) Attempt any TWO [16]

a) Explain open loop congestion control.

b) What is ICMP? Explain error reporting messages in ICMP.

c) Explain RSA algorithm.

Q5) Attempt any TWO [16]

a) Compare Virtual Circuits and Datagram.

b) Explain symmetric key cryptography.

c) Explain Distance Vector Routing algorithm with suitable example.

Q6) Write a short note on - (any THREE) [18]

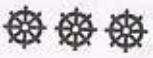
a) Choke packets

b) UDP header format

c) ARP

d) Digital Signature

e) Flooding



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Total No. of Pages :2

Seat No.	

B.E. (Part - IV) (Electronics & Telecom. Engg.) (Semester - VII) Examination, November - 2017

RF & MICROWAVE ENGINEERING (Revised)

Sub. Code : 67631

Day and Date : Tuesday, 21- 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m to 05.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) Attempt any two of the following:

a) Derive field equation for TE mode in rectangular wave guide. Show that TE_{10} is dominent mode. **[8]**

b) The TE_{10} mode is propagated in a rectangular waveguide of dimensions a = 6cms and b=40cms.By means of a travelling detector, the distance between a maximum and minimum is found to be 4.55 cm. Find the frequency of the wave. **[8]**

c) Explain power losses in waveguide. **[8]**

Q2) Attempt any two of the following:

a) Explain isolators with constructional details and how faradays rotation in ferrites is used as advantage in construction & isolator. **[8]**

b) With & matrix explain magic tee. **[8]**

c) Explain types & working of directional coupler with S parameters. Mention its application. **[8]**

Q3) Attempt any two of the following:

a) A two cavity klystron amplifier has the following characteristics voltage gain = 15db, Input power = 5mw Rsh of input cavity = 30 kΩ, RL (Load impedance) = 40 kΩ determine 1) The input rms voltage 2) the output rms voltage 3) the power delivered to the load. **[9]**

b) Differentiate between TWT and Klystron. **[9]**

c) Explain magnetron construction, working and types. **[9]**

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SECTION - II

Q4) Solve any two.

a) Explain with diagram IMPATT Diodes. [8]

b) Explain Tunnel diode with energyband diagram. [8]

c) What is Gunn effect? Explain using two valley theory. [8]

Q5) Solve any two.

a) Explain Industrial scientific-medical (ISM) applications of Microwave. [8]

b) Two identical 30dB directional couplers. are used to sample incident and reflected power in a waveguide. VSWR.=2 and the output of the coupler sampling Incident power = 4.5 mw. What is the value of reflected power? [8]

c) Explain different microwave power measuring techniques. Also explain how to measureVSWR using different techniques. [8]

Q6) Solve any two.

a) Write a note on materials for MMIC. [9]

b) Explain microwave hazards HERO, HERF and HERP. [9]

c) Explain different MMIC fabrication techniques and also explain thin film formation in monolithic microware integrated circuit. [9]

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Seat No.	

Total No. of Pages : 2

B.E. (Electronics & Telecommunication Engineering)
(Semester - VII) Examination, November - 2017
ROBOTICS (Elective - I)
Sub. Code : 67632

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figure to right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) Attempt Any TWO of the following **[2 × 8 = 16]**

a) Explain Power Transmission system in detail.

b) Explain in detail classification of robot by Control Method.

c) Explain basic control system model with Transfer function and Block Diagram.

Q2) Attempt Any THREE of the following **[3 × 6 = 18]**

a) Explain Accelerometer Sensor.

b) Explain history of Robotics.

c) Explain Control System Analysis.

d) Explain Slip sensor & Tactile sensor.

Q3) Attempt Any TWO of the following **[2 × 8 = 16]**

a) Explain in detail classification of robot by Co ordinate system Method.

b) Explain Proximity Sensor in detail.

c) Explain optical Position Sensor

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Q4) Attempt Any TWO of the following [2 × 8 = 16]

a) Explain Application of robot in Machine Loading and Unloading.

b) Explain mechanical gripper in detail.

c) Explain significance of WAIT, SIGNAL and DELAY commands using suitable example.

Q5) Attempt Any THREE of the following [3 × 6 = 18]

a) Explain generation of robot programming Language in detail.

b) Explain Robot End Effectors Interface.

c) Explain Textual Robot Language.

d) Explain Consideration in Gripper Selection & design.

Q6) Attempt Any TWO of the following [2 × 8 = 16]

a) Explain Application of robot in Spray coating.

b) Explain Lead Through Programming Method.

c) Explain Spot Welding.

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Total No. of Pages :2

Seat No.	

B.E. (Electronics & Telecommunication) (Semester - VIII) (Revised) Examination, November - 2017

DIGITAL IMAGE PROCESSING

Sub. Code: 67818

Day and Date :Friday, 03 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) Attempt any two of the following: **[2×8=16]**

a) Explain basic concept of sampling and quantization of images to convert in digital form.

b) Draw the structure of human eye and explain elements of visual perception.

c) Explain the components of image processing system with neat block diagram.

Q2) Attempt any two of the following: **[2×8=16]**

a) Explain power law transformation and log transformation with their characteristic curve.

b) Explain Haar transformation.

c) What is meant by histogram of an Image? Explain the significance of histogram equalization

Q3) Attempt any two of the following: **[2×9=18]**

a) Explain the significance of first order and second order derivative for image sharpening.

b) Explain high pass filters in frequency domain.

c) Explain linear and non - linear smoothing filters in spatial domain.

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Q4) Attempt any two of the following: **[2×8=16]**

a) Explain Hit - or - Miss transform in detail.

b) Explain Erosion operation in detail along with mathematical expressions and example.

c) What is use of region filling algorithm? Explain the steps for region filling inside an object in an image with example.

Q5) Attempt any two of the following: **[2×8=16]**

a) Explain region splitting and merging algorithm in detail.

b) What is global and adaptive thresholding, explain in detail

c) How to detect a line or edge in an image explain with an example?

Q6) Attempt any two of the following: **[2×9=18]**

a) What is coding redundancy? Explain with the help of example.

b) What is lossy predictive coding, explain in detail.

c) Draw the block diagram of image compression model and explain in detail.

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Total No. of Pages :3

Seat No.	

T.E. (Mechanical) (Part-III) (Semester - VI) (Revised) Examination, November - 2017

METROLOGY AND QUALITY CONTROL

Sub. Code :66839

Day and Date : Friday , 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume any data if necessary and state it clearly**

Q1) Solve any two of the following **[18]**

a) What is the limit gauges. Explain the 'Taylor's principle for design of 'limit gauges'

b) Explain the following terms with neat sketch.

i) Unilateral tolerance

ii) Bilateral tolerance

iii) Upper deviation

iv) Lower deviation

c) Calculate the limits of the following 25 H7 d8 designated fit, identify it and draw it graphically, the standard tolerance is given by

$i = 0.45D^{\frac{1}{3}} + 0.001D$

i) 25 lies between steps of 18-30mm

ii) Fundamental deviation of d shaft=$-16D^{0.44}$

iii) for grade IT7 tolerance = 16i and for IT8 tolerance=25i

iv) Fundamental deviation of H-hole=0

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Q2 Solve any two of the following [16]

a) Compare mechanical comparator with optical comparator with the help of neat sketches.

b) Explain the use of sine bar for measuring an angle with the help of neat sketch and state its limitations.

c) Explain construction, working and limitations of sigma comparator.

Q3) Solve any two of the following [16]

a) Define straightness and flatness. Briefly explain how straightness and flatness is measured and specified.

b) Explain principle and working of Tomlinson's surface meter with neat sketch.

c) Define surface texture, Lay and explain ten point average method for surface finish measurement.

Q4) Solve any two of the following [16]

a) Define major diameter, effective diameter and enumerate various errors in screw thread.

b) Derive an expression for effective diameter measurement by 2-Wire method for external threads.

c) Describe the gear tooth vernier caliper and explain its use for checking tooth thickness.

Q5) Solve any two of the following [16]

a) Differentiate between quality control and quality assurance.

b) What is cost of quality? Explain cost of failure, cost of appraisal and cost of prevention.

c) Discuss the factors that control, quality of design and quality of conformance.

Q6) Solve any two of the following [18]

a) State the advantages, applications of control charts and sketch different patterns of control charts

b) Discuss following acceptance sampling terms

i) Average out going quality

ii) Average out going quality level

iii) Accepted quality level

c) A machine is working to a specification 80.75± 0.1mm a study of 32 consecutive pieces shows the following measurements. Construct the $\overline{X}$ and R chart and calculate process capability (For sample size of 8 take A_2 =0.37, D_4 =1.86, D_3 =0.14,d_2=2.847)

1st day	2nd day	3rd day	4th day
80.74	80.76	80.77	80.73
80.73	80.76	80.72	80.75
80.72	80.75	80.77	80.81
80.74	80.73	80.71	80.77
80.74	80.75	80.73	80.74
80.76	80.75	80.74	80.74
80.78	80.77	80.76	80.80
80.78	80.77	80.80	80.81

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Total No. of Pages :3

Seat No.	

T.E. (Mechanical) (Semester - VI) (Revised) Examination, November - 2017
INDUSTRIAL FLUID POWER
Sub. Code: 66838

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Draw neat diagrams/sketches wherever necessary.**
3) **Figures to right indicates full marks.**

Q1) Solve any two:

a) Explain in brief the basic requirements of a Pneumatic system. **[7]**

b) Explain the important properties of hydraulic fluids. **[7]**

c) Draw the symbols and explain the function of the following elements:**[7]**

i) F.R.L unit

ii) Four way, three position-open center solenoid operated D.C valve.

iii) Weight loaded Accumulator.

iv) time delay valve.

Q2) Solve any three:

a) Explain the working of swash plate type axial piston pump with neat sketch. **[6]**

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b) Explain the function of cushioning in cylinders with neat sketch. **[6]**

c) Explain fluid conditioning and also explain with neat symbols types of reservoirs. **[6]**

d) Classify intensifiers and explain any one of them. **[6]**

Q3) Solve any three:

a) Draw a schematic of 4/2 pilot operated DCV and briefly explain its function. **[6]**

b) Draw schematically a sequence valve and explain its function. **[6]**

c) Explain the working of pressure compensated flow control valve with neat sketch. **[6]**

d) Explain use of any two center positions of D.C valves in hydraulic circuits. **[6]**

Q4) Solve any three:

a) Explain with neat sketch working of screw compressor used in pneumatic systems. **[6]**

b) Explain schematically different piping layouts in Pneumatic systems. **[6]**

c) Explain with the help of neat sketch the construction and working of air motor. **[6]**

d) Explain the working of 5/2 Direction control valve with a neat sketch. **[6]**

Q5) Solve any Three.

a) A vehicle is raised and held for about five hours and is to be descended slowly without any jerks, suggest and draw a suitable hydraulic circuit for the same. **[6]**

b) Explain the speed control circuit for an air motor. **[6]**

c) With the aid of circuit diagram explain the use of shuttle valve in pneumatic circuit. **[6]**

d) Explain with circuit diagram travel dependent sequencing mechanism in hydraulic system. **[6]**

Q6) Write short notes on: (Solve any two)

a) Pneumatic servo system. **[7]**

b) Safety precautions in handling hydraulic systems. **[7]**

c) Fluidics. **[7]**

What will be your decision under the following approaches

i) Optimistic Criterion

ii) Pessimistic Criterion

iii) Leplace Criterion

iv) Hurwicz Criterion ($\alpha = 0.7$)

c) Draw the project network for the following activities and determine critical path and project duration.

Activity	Preceding activity	Duration (days)
A	-	8
B	A	12
C	A	8
D	B,C	7
E	A	8
F	D,E	17
G	C	21
H	F,G	9
I	H	11

d) Determine optimal sequence, elapsed time and idle time of the following six jobs on the machine M1,M2 and M3 used in the same sequence to process these jobs.

	Jobs					
Machines	J1	J2	J3	J4	J5	J6
M1	15	14	16	13	10	8
M2	8	10	7	15	11	9
M2	8	10	7	15	11	9

Total No. of Pages :4

Seat No.	

T.E. (Mechanical) (Part - II) (Semester - VI) (Revised) Examination, November - 2017

INDUSTRIAL MANAGEMENT & OPERATIONS RESEARCH

Sub. Code: 66837

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**
4) **All questions are to be solved on one answer book only.**

Q1) Attempt any four (5 Marks Each) **[20]**

a) State the need of planning in manufacturing a component from vendors.

b) Explain in brief Process of Organizing.

c) Is there any difference between Authority & Responsibility. Justify your answer with suitable example.

d) Discuss the implications of the Herzberg's theory as a strategy for motivating employees.

e) Whether controlling is an essential function of management? If yes then explain the steps involved in controlling process?

Q2) Attempt any two (6 Marks Each) **[12]**

a) Which factors related to environmental influence sugar manufacturing industry?

b) What are the problems of SSI involved in manufacturing components of automobile sector?

c) How to prevent an accident in a gas welding section of fabrication unit? Does the purchasing of safety equipments increases cost of operation?

Q3) Write short notes on any three (6 Marks Each) **[18]**

a) Types of markets

b) 4 P's of market

c) Functions of Purchase department

d) Purchase policy and procedure

e) Cost estimation

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Q4) Attempt any three (6 Marks Each) **[18]**

a) Define Operations Research. Briefly explain the characteristics of Operations Research.

b) Use graphical method to solve the following,

Maximize $Z = 5X_1 + 4X_2$

Subjected to constraints,

$5X_1 + 2X_2 \leq 40$,

$3X_1 + 3X_2 \leq 30$

$3X_1 + 5X_2 \leq 45$

$X_1, X_2 \geq 0$.

c) A company manufactures three jobs namely X, Y and Z. Each of the product require processing on three machines, Turning, Milling and Drilling. Product X requires 5 hours of turning, 2 hours of milling and 20 minutes of drilling. Product Y requires 3 hours of turning, 5 hours of milling and 30 minutes of drilling, and Product Z requires 1 hour of turning, 2 hours of milling and 30 minutes of drilling. In the coming planning period, 270 hours of turning, 220 hours of milling and 50 hours of drilling are available. The profit contribution of X,Y and Z are Rs. 500, Rs.750 and Rs. 1000 per unit respectively. Formulate LPP to maximize the profit. Suggest suitable method for solution of LPP.

d) Use simplex to solve the following problem and obtain initial and second feasible solution (two simplex tables only)

Minimise $Z = 5X_1 + 3X_2 + 2X_3$

subjected to constraints,

$3X_1 + 2X_2 + 2X_3 \leq 120$,

$2X_1 + 3X_2 + 3X_3 \leq 240$

$X_1, X_2, X_3 \geq 0$.

Q5) Attempt any two (7 Marks Each) **[14]**

a) How does the problem of degeneracy arise in a transportation problem? Explain how one can overcome it?

b) The unit transportation cost along with capacity and requirements from a supplier to a restaurant is as given below

Supplier	Restaurant				Capacity
	1	2	3	4	
A	25	40	75	20	4000
B	50	40	65	25	3000
C	25	50	70	40	3000
Requirements	1600	2400	3000	2000	

Obtain initial basic feasible solution by least cost method & VAM

c) A company has four workers and five jobs. Expected profit in Rs. for each job when assigned to different workers is given in the matrix below. Solve the assignment problem & estimate the total profit

Worker	Jobs				
	A	B	C	D	E
1	60	76	48	99	80
2	69	82	59	71	57
3	85	90	109	69	79
4	46	62	85	75	78

Q6) Write short notes on any three (6 Marks Each) **[18]**

a) Explain the various quantitative methods that are useful for decision making under risk.

b) The following matrix gives the payoff (in Rs.) of different strategies against events.

Strategies	Events			
	E_1	E_2	E_3	E_4
S_1	4,000	100	6,000	18,000
S_2	20,000	5,000	400	0
S_3	20,000	15,000	2,000	1,000

Total No. of Pages : 3

Seat No.

T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MANUFACTURING ENGINEERING

Sub. Code : 66245

Day and Date : Wednesday, 22 - 11 - 2017 Total Marks : 100

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume if necessary suitable data and state them clearly.
4) Use of non-programmable calculators is permissible.

SECTION - I

Q1) Solve any two:

a) Explain with neat sketch the types of milling cutters. [8]

b) Derive an expression for Shear strain. [8]

c) In an Orthogonal cutting of the material, Cutting force (F_H) =138Kg, Feed force (F_v) = 68Kg, Rake angle (α) =7°, Chip thickness ratio (r) = 0.4. Determine

i) Coefficient of friction of chip

ii) Shear force (Fs) and normal to shear force (Fn). [8]

Q2) Solve the following questions.

a) Define machinability. Explain the factors affecting machinability. How the machinability index is defined? [8]

OR

a) Explin concept of wear & types of wear with sketch. [8]

b) Determine [8]

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i) Taylor's Tool life equation

ii) Cutting speed for 6 minutes of tool life when tool life of 70 minutes is obtained at a speed of 25m/min and 15 minutes at 40m/min.

The component shown in fig. is to be processed on a single spindle automat. Study the component and prepare: **[18]**

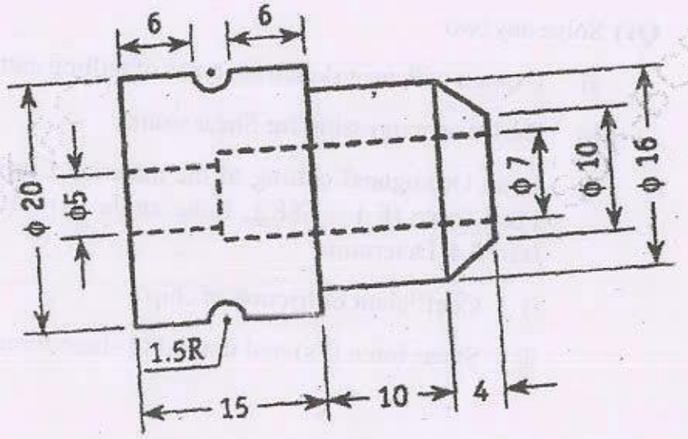
a) Detailed process sheet

b) Tool Layout

c) Cam profile for drilling operation-of ϕ5 mm hole through

d) Calculate Production rate per hour

Material –ϕ 20 Bronze bar All dimensions are in mm.



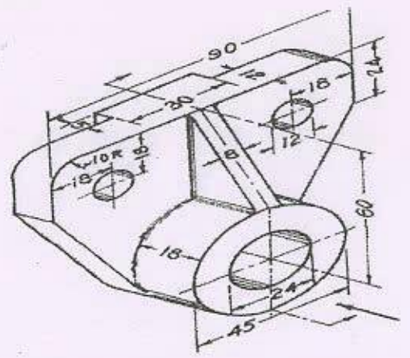
SECTION - II

Q4) Design & draw neat dimensional drawing in three views with one sectional view of jig for drilling two holes ϕ12 in the given bracket as shown in figure. **[26]**

OR

Design & draw neat dimensional drawing in three views with one sectional view of Milling fixture for creating plane surface of ϕ 24mm of the given bracket as shown in figure.

Also Justify the selection of location, clamping & guiding elements.



) Attempt any two.

a) Explain with neat sketch the Compound die. **[6]**

b) Explain types of Stock stop. **[6]**

c) Explain the importance of following in Press working **[6]**

i) Strippers

ii) Clearanace

[12]

6) Write short notes any three.

a) Construction & working of CNC.

b) Automatic Tool Changer.

c) CNC axes and drives.

d) Modular Tooling System.

Q6) a) Explain the step by step procedure for selection of V- belt from Manufacturer's Catalogue. [6]

b) It is required to select flat belt drive for a fan running at 360 rpm which is driven by a 10kW 1440 rpm motor. The belt drive is open type and space is available for a center distance of 2 m approximately. The belt should operate at velocity between 17.80 m/s to 22.90 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0118 kW. The load correction factor can be taken as 1.2. Suggest preferred pulley diameters for the motor and fan pulleys and give complete specifications of belting. Refer the tables given below. [10]

Arc of Contact Factor (F_d)

α_s(Deg)	130	140	150	160	170	180	190	200
F_d	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard Widths of these belts in mm

3–Ply	25	40	50	63	76					
4–Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

For flat pulleys: Series of preferred values of pitch diameters (in mm) are as follows.

Pitch diameter (mm):	125	132	140	150	160	170	180	0	
200	212	224	236	250	265	280	300	315	355	375
400	425	450	475	500	530	560	600	630	670	710
750	800	900	1000							

Total No. of Pages :4

Seat No.

T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MACHINE DESIGN - I

Sub. Code: 66244

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumption wherever required and state them clearly.**
4) **Use of non-programmable calculator is permitted.**
5) **Draw neat diagrams wherever necessary.**

Q1) Solve any Three: [18]

a) Summarize material selection procedure adopted for designing a machine element.

b) Name different theories of failure.Illustrate the use of theory of failure for brittle material.

c) Explain the design procedure for a turn-buckle with the help of neat sketch.

d) Write a note on design of bolted joints with load perpendicular to the axis of bolt.

Q2) a) A bell crank lever to raise a vertical load is shown in fig 2a. The vertical load to be lifted is 4500N. The lever consists of forged steel material and a pin at the fulcrum F. Assume following data for the lever material. Safe stress in tension = 75 MPa; safe stress in shear=60MPa; safe bearing pressure on pins=10N/mm². Determine the pin diameter at end P, dimensions at F and cross section Y-Y (near to fulcrum) [8]

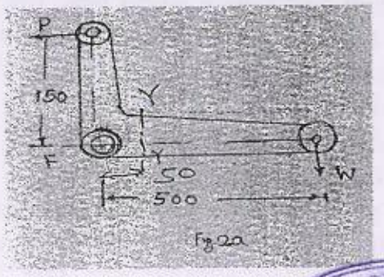
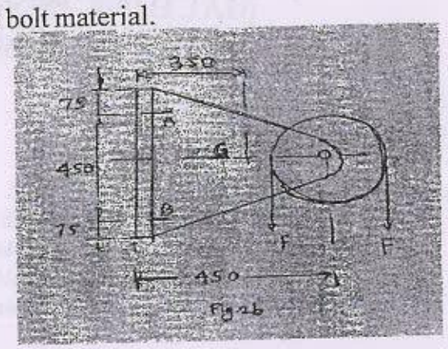


Fig 2a

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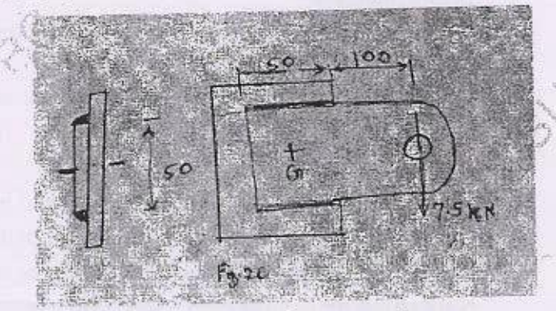
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b) Figure 2b shows a pulley bracket, which is supported by 4 bolts, two at A and two at B. The weight of pulley and bracket, W is 1850N, and the load, F on the rope is 20kN.
Determine the size of the bolts, using an allowable shear stress of 40 MPa for the bolt material. **[8]**



OR

c) A welded connection as shown in figure 2c is subjected to the eccentric force of 7.5 kN. Determine the size of welds if the permissible shear stress for the weld is 90N/mm². Assume static conditions. **[8]**



Q3) a) Discuss the design procedure for square key. **[6]**

b) A splined connection with the following particulars is used for a gear and shaft assembly in a gear box. The power to be transmitted is 20kW at 240 r.p.m. The bearing pressure on the splines is limited to 6.5.MPa during sliding. The coefficient of friction is 0.1 **[10]**
Major diameter = 60mm
Minor diameter = 54 mm
Number of splines = 10
Determine (i) The length of gear hub
ii) The force required to shift the gear.

OR

c) Design a cast iron protective type flange coupling to transmit 15 kW at 900 r.p.m. from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used:
Shear stress for shaft, bolt and key material =40MPa
Crushing stress for bolt and key = 80 MPa
Shear stress for cast iron = 8 Mpa
Draw a neat sketch of the coupling. **[10]**

Q4) a) What are the various types of springs used in practice? Explain one application of each. **[6]**

b) Design a close coiled helical compression spring for a service load ranging from 2245N to 2745N. The axial deflection of the spring for this load range is 6mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity is 84kN/mm². Assume squared and ground ends for coil. Neglect the effect of stress concentration. Draw fully dimensioned sketch of the spring.
Std. wire gauge (SWG) number and corresponding diameter of spring wire is given in the following table. **[10]**

SWG	6/0	5/0	4/0	3/0	2/0
Diam.mm	11.785	10.973	10.160	9.490	8.839

Q5) a) Derive an expression for maximum efficiency for square threaded screw. **[6]**

OR

What is recalculating ball screw? Explain with neat sketch.

b) The power transmission screw of a screw press is required to transmit maximum load of 100 kN and rotates at 60 RPM. The trapezoidal threads are to be used as under:

Nominal Dia. mm	40	50	60	70
Core Dia. mm	32.50	41.50	50.50	59.50
Mean Dia. mm	36.50	46.00	55.50	65.00
Core Area mm²	830	1353	2003	2781
Pitch mm	7	8	9	10

The screw thread friction coefficient is 0.12. The torque required for collar friction and journal bearing is about 10% of the torque to drive the load considering screw friction. Determine screw dimensions and its efficiency. Also determine the motor power required to drive the screw. The maximum permissible compressive stress in the screw is 100 MPa. **[12]**

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Seat No.	

T.E. (Mechanical) (Part-III) (Semester-V) (Revised)
Examination, November - 2017
HEAT AND MASS TRANSFER
Sub. Code : 66243

Day and Date : Tuesday, 14-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume Suitable Data wherever necessary and state it Clearly.**
4) **Use of scientific non programmable calculator is permitted.**

Q1) Solve any three:

a) Define critical radius of insulation. Also derive the equation for critical radius of insulation for hollow sphere. **[6]**

b) Explain the different modes of mass transfer. Explain with suitable examples. **[6]**

c) A 0.8m high and 1.5m wide double pane window consist of two 4mm thick layer of glass (k = 0.78 W/mK) separated by 10mm wide stagnant air space (k = 0.0626 W/mK). Determine the rate of heat transfer through this window when room is maintained at 20°C and outside air is at -10°C. Take convective heat transfer coefficient as 10 and 40 W/m²K. **[6]**

d) An aluminum pipe carries steam at 110°C. The pipe (k = 185 W/mK) has an inner diameter of 10cm and outer diameter of 12cm. The pipe is located in a room where the ambient air temperature is 30°C and convective heat transfer coefficient is 15 W/m²K. Determine heat transfer rate per unit length of pipe. Neglect convective heat transfer on steam side. **[6]**

Q2) Solve any two:

a) Derive expression for temperature distribution of a solid cylinder generating heat at the rate of q unit per unit volume. **[8]**

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b) Derive expression of temperature distribution for a solid body by using lumped heat capacity approach. **[8]**

c) A solid copper sphere of 10cm diameter (ρ = 8954 kg/m^3, C_p = 383 J/kgK, k = 386 W/mK). Initially at uniform temperature 250°C, it suddenly immersed in a fluid which is maintained at uniform temperature of 50°C. The heat transfer coefficient between sphere and fluid is 200 W/m^{2}K. Determine the temperature of copper sphere at 5 minutes after immersion. **[8]**

Q3) Solve any two:

a) Derive an expression for temperature distribution along the length of a pin fin with insulated tip. **[8]**

b) A 1m long, 5cm diameter cylinder placed in an atmosphere of 40°C is provided with 12 fins (k = 75 W/mK), 0.75mm thick, The fins protrudes 2.5cm from the cylinder surface. The heat transfer coefficient is 23.3 W/m^{2}K. Calculate the rate of heat transfer if the surface temperature of cylinder is 150°C. **[8]**

c) Determine thermal conductivity of long solid 2cm diameter rod, 1 end of the rod is inserted in a furnace while remaining portion is projected out in air at 30°C. After steady state has been reached, the temperature at two points on the rod which are 10cm apart are measured and found to be 120°C and 90°C respectively. If heat transfer coefficient is 20 W/m^{2}K. What will be thermal conductivity of the rod? **[8]**

Q4) Solve any two of the following:

a) With the help of dimensional analysis, analyze natural convection heat transfer problem. **[8]**

b) A vertical cylinder 1.5m high and 180mm in diameter is maintained at 100°C in an atmosphere environment of 20°C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean film temperature as, ρ= 1.06 kg/m^3, γ= 18.97×10^{-6}m^2/s, C_p=1.004 kJ/kg°C and k=0.0285 w/m°C, Pr = 0.708. **[8]**

Use correlation; $Nu_L = 0.10\ (Gr.Pr)^{1/3}$.

c) Air at a temperature of 20°C flows through a rectangular duct with a velocity of 10m/s. The duct is 30cm×20cm in size and air leaves at 34°C. Find the heat gain by air when it is passed through 10m long duct. The properties of air at 27°C are ρ=1.1774 kg/m^3, γ= 15.68 10^{-6}m^2/s, C_p=1057 J/kgK and k=0.03003 W/mK, Pr = 0.708. **[8]**

Use correlation ; $Nu = 0.023\ (Re)^{0.8}\ pr^{0.4}$.

Q5) Solve any two of the following:

a) Write a short notes on; **[8]**

i) Shape factor and its properties

ii) Radiation shield

b) Write plank's law and derive Stefan Boltzman law from Plank's law. **[8]**

c) The effective temperature of a body having an area of 0.12m^2 is 527°C. **[8]**

Calculate;

i) The total rate of energy emission

ii) The intensity of normal radiation

iii) The wavelength of maximum monochromatic emissive power

Q6) a) Draw the temperature distribution curve for following heat exchangers (any 3) **[6]**

i) Counter flow heat Exchanger

ii) Evaporator

iii) Parallel flow heat Exchanger

iv) Condenser

b) What are the design considerations of heat exchangers? **[6]**

c) The flow rates of hot and cold water streams running through a parallel flow heat exchanger are 0.2kg/s and 0.5kg/s respectively. The inlet temperatures of hot and cold sides are 75°C and 20°C respectively. The exit temperature of hot water is 45°C. If overall heat transfer coefficient is 325 W/m^{20}C, calculated the area of heat exchanger. Assume C_p of water 4.187 kJ/kgK. **[6]**

✈ ✈ ✈

b) The crank and the connecting rod of a 4 - cylinder in-line engine running at 1800 r.p.m. are 60 mm and 240 mm each respectively and the cylinders are spaced 150 mm apart. If the cylinders are numbered 1 to 4 in sequence from one end, the cranks appear at intervals of 90° in an end view in the order 1 - 4 - 2 - 3. The reciprocating mass corresponding to each cylinder is 1.5 kg. Determine:

i) Unbalanced primary and secondary forces, if any, and

ii) Unbalanced primary and secondary couples with reference to central plane of the engine. **[12]**

Q6) a) Derive expression for energy stored in a flywheel. **[6]**

b) A single cylinder double acting steam engine develops 150 kW at a mean speed of 80 rpm.The coefficient of fluctuation of energy is 0.1 and the fluctuation of speed is ± 2% of mean speed. If the mean diameter of the flywheel rim is 2 metre and the hub and spokes provide 5 % of the rotational inertia of the flywheel, find the mass and cross-sectional area of the flywheel rim. Assume the density of the flywheel material as 7200 kg/m^3. **[10]**

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Total No. of Pages :4

T.E. (Mechanical Engineering) (Part - III) (Semester - V) (Revised) Examination, November - 2017
THEORY OF MACHINES - II
Sub. Code: 66242

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume if necessary suitable data and state clearly.**
5) **Use of Non programmable calculator is permitted.**

Q1) a) Give the classification of Toothed Gearing and define the following terms.

i) Addendum.

ii) Module. **[8]**

OR

Derive the expression for the velocity of sliding between pair of involute teeth and define the terms.

i) PitchCircle.

ii) Diametral Pitch.

b) A pair of Spur gears with involute teeth is to give a gear ratio of 4 : 1. The arc of approach is not to less than the circular pitch and smaller wheel is the driver. The angle of pressure is 14.5°. Find

i) the least number of teeth that can be used on each wheel and

ii) the addendum of the wheel in terms of the circular pitch. **[10]**

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2) a) What are the various types of the torques in an epicyclic gear train. **[6]**

OR

Explain the concept of equivalent mass and moment of inertia applied for gear trains.

b) Fig. 2 b shows an epicyclic gear train with compound planets 'B - C', 'B' has 15 teeth and meshes with an annulus 'A' which has 60 teeth. 'C' has 20 teeth and meshes with the sunwheel 'D' which is fixed. The annulus is keyed to the propeller shaft 'Y' which rotates at 740 rad/s. The spider which carries the pins upon which the planets revolve is driven directly from main gear box by shaft 'X', this shaft being relatively free to rotate with respect to wheel 'D'. Find the speed of shaft 'X', when all the teeth have same module. When engine develops the 130 kW, what is the holding torque on the wheel 'D'? Assume 100 percent efficiency throughout. **[10]**

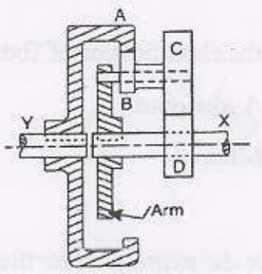


Fig. 2 b.

3) a) Condition for stability of two wheel vehicle moving in a curved path. **[6]**

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 rpm. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic couple in the following conditions.

i) The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.

ii) The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.

iii) The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern. **[10]**

4) a) Derive the equation for inertia torque analytically considering the effect of inertia of the connecting rod. **[6]**

OR

Derive an expression for velocity and acceleration of the slider of slider crank mechanism.

b) In a vertical double acting steam engine, the connecting rod is 4.5 times the crank. The weight of the reciprocating parts is 120 kg and the stroke of the piston is 440 mm. The engine runs at 250 rpm. If the net load on the piston due to steam pressure is 25 KN when the crank has turned through an angle of 120° from the top dead centre, determine the

i) thrust in the connecting rod.

ii) pressure on the slide bars.

iii) tangential force on the crank pin.

iv) thrust on the bearings.

v) turning moment on the crank shaft. **[10]**

5) a) Explain balancing of single rotating mass by two masses rotating in different planes. **[6]**

OR

Explain direct and reverse crank method for balancing of radial engine.

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Q4) a) Sketch root locus plot for $G(S)\,H(S) = \dfrac{K}{S(S^2+6.S+12)}$. [12]

b) A unity feedback control system is having an open loop transfer function $G(S) = \dfrac{K(S+13)}{S(S+3)(S+7)}$. Determine the range of values of K for the system to be stable. [6]

Q5) a) Sketch the Bode plot for the transfer function $G(S) = \dfrac{1000}{S(1+0.1.S)(1+0.001.S)}$. Determine gain margin and phase margin. [10]

b) Calculate break in point and angle of departure for the control system, given by characteristic equation $S^2 + 2S + 3 + K(S+2) = 0$. [6]

Q6) a) The motion of a numerically controlled machine tool is described by the differential equation $\ddot{y} + 7.\dot{y} + 10.y = f(t)$. Determine computer diagram and state space representation using parallel method. [8]

b) The motion of robot arm controlled by an electric motor is given by the differential equation $\ddot{y} + 6.\dot{y} + 9.y = f(t)$. Use series programming to determine computer diagram. [8]

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Total No. of Pages : 4

Seat No.

T.E. (Mechanical) (Semester - V) Examination, November - 2017

CONTROL ENGINEERING

Sub. Code : 66241

Day and Date : Thursday, 09 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right Indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

Q1) a) For the mechanical system shown in Fig. 1 a, prepare grounded chair representation and construct electrical circuit using force current analog. [6]

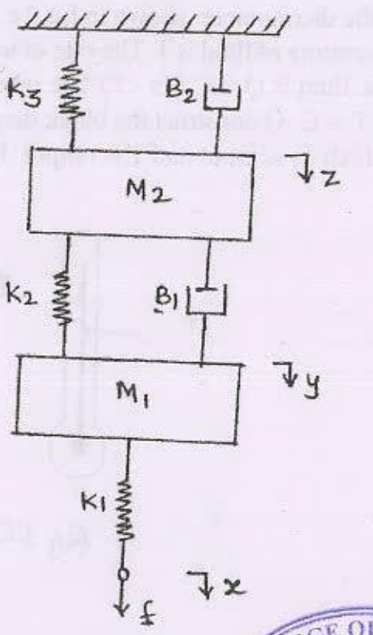


fig 1 a

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b) For the fluid system shown in Fig. 1b, determine equation of P1 in terms of P2 and P. [6]

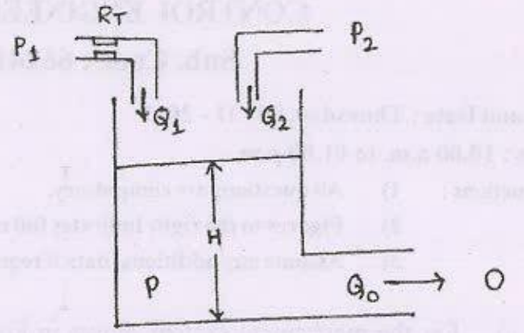


fig 1 b

c) For the thermometer shown in fig. 1c, the ambient temperature is Ts and temperature of fluid is T. The rate of heat flow from surrounding medium to the fluid is $Q = C_1(Ts - T)$ The rate of change of temperature of fluid is $D.T. = C_2.Q$ construct the block diagram representation for the system in which Ts is input and T is output. Determine time constant. [6]

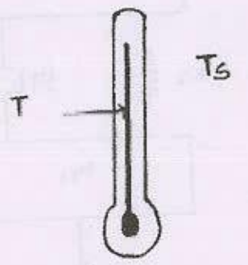


fig 1C

22) a) Determine linear approximation for the equation $Z = \sin X . \cos Y$ for $Xi = 60°$ and $Yi = 30°$, What is approximate value of Z when $X = 63°$ and $Y = 28°$. [8]

b) Reduce the block diagram shown in fig. 2b and obtain transfer function. [8]

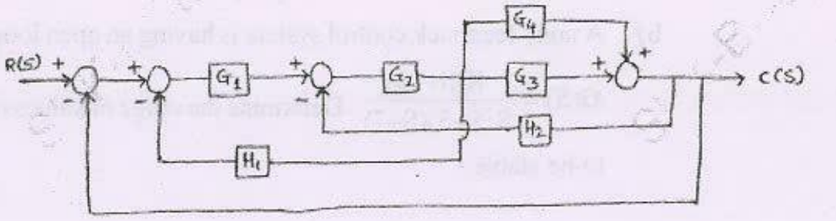


fig 2 b

23) a) A hydraulic control system is shown in fig. 3a. The forcing function is $r(t) = u(t)$ and all initial conditions are zero. Determine the response c(t) of system. [8]

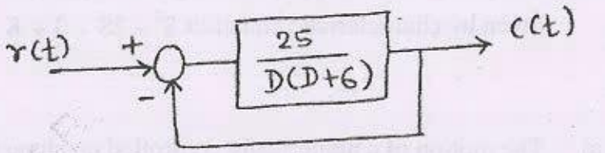


fig. 3 a

b) For the control system shown in fig. 3b, determine K_1, K_2 and a such that the system will have a steady state gain of 1, a natural frequency of 2 and damping ratio of 0.5. [8]

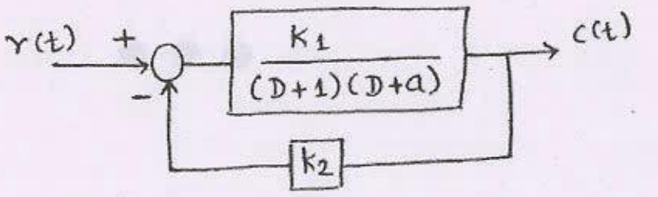


fig. 3 b

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Total No. of Pages : 4

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T.E. (Mechanical Engg.) (Part - III) (Semester-VI) Examination, November - 2017

MACHINE DESIGN - II

Sub. Code : 66840

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat sketches whenever necessary.**
3) **Figures to the right indicate full marks.**
4) **Make suitable assumptions if necessary and state it clearly.**

SECTION-I

Q1) a) Define stress concentration. What are causes and remedies over stress concentration? **[8]**

OR

a) Explain the following terms in relation with design of component subjected to fluctuating loads:
   i) Endurance limit
   ii) Surface finish factor
   iii) Size factor
   iv) Notch sensitivity

b) A work cycle of a mechanical component subjected to completely reversed bending stresses consist of the following three elements: **[8]**
   i) $\pm$ 350 N/mm^2 for 85% of time
   ii) $\pm$ 400 N/mm^2 for 12% of time
   iii) $\pm$ 500 N/mm^2 for 3% of time

   The material for the component is 50C4 (S_{ut} = 660 N/mm^2) and the corrected endurance limit of the component is 280 N/mm^2. Determine the life of the component.

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Q2) a) Explain the following terms in connection with roller bearing, **[8]**

i) Static load capacity

ii) Dynamic load capacity

iii) Equivalent load capacity

iv) Load - life relationship

OR

a) Differentiate between static and dynamic capacity of the ball bearing. What is their significance in the selection of the bearings?

b) A deep-groove ball bearing having bore diameter of 60 mm and rotating at 1440 r.p.m. is subjected to radial force of 2500N and an axial force of 1200 N. The radial and thrust factors are 0.56 and 2.0 respectively. The load factor is 1.2. The expected rating life is 25,000 hrs. Calculate the required dynamic load capacity and select the bearing from manufacturer's catalogue given below in table no. 1. **[8]**

Table no.1

Principal Dimensions				Basic Capacity	
Bearing No.	Bore Dia 'd' mm	Outside Dia 'D'mm	Width 'B' mm	Static 'Co' kN	Dynamic 'C' kN
6012	60	95	18	23.20	29.60
6212	60	110	22	32.50	47.50
6312	60	130	31	52.00	81.90
6412	60	150	35	69.50	108.00

Q3) a) Explain the following terms in relation to sliding contact bearings, **[8]**

i) Length to diameter ratio

ii) Unit bearing pressure

iii) Radial Clearance

iv) Minimum film thickness

OR

a) With neat sketches, describe construction and working principles of hydrodynamic bearings.

b) The following data is given for a 360° hydrodynamic bearing. **[10]**

Radial load = 3.2kN

Journal speed = 1490 rpm

Journal diameter = 50 mm

Bearing length = 50 mm

Radial clearance =0.05 mm

Viscosity of lubricant = 25 cp

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate

i) Coefficient of friction

ii) Power lost in friction

iii) Minimum oil film thickness

iv) Flow requirement in litres/min

v) Temperature rise

Refer following data table:

l/d	ε	h_0/C	S	ϕ	(r/C)f	$Q/(rCn_sl)$
1	0.1	0.6	0.264	63.10	5.79	3.99
	0.6	0.4	0.121	50.58	3.22	4.33
	0.8	0.2	0.0446	36.24	1.70	4.62
	0.9	0.1	0.0188	26.45	1.05	4.74
	0.97	0.03	0.0047	15.47	0.514	4.82

SECTION - II

Q4) a) Explain different types of gear tooth failure. **[8]**

OR

a) Explain the force analysis in the design of spur gears.

b) It is required to design a pair of spur gears with 20° full-depth involute teeth consisting of a 20-teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW, 1450 rpm electric motor. The starting torque of the motor can be taken as 150% of the rated torque. The material of the pinion is plain carbon steel Fe410 (S_{ut} = 410 N/mm^2), while the gear is made of grey cast iron FG 200 (S_{ut} = 200 n/mm^2). The factor of safety is 1.5. Design the gears based on the Lewis equation and using velocity factor to account for the dynamic load. Lewis form factors for 20 and 50 teeth are 0.32 and 0.408 respectively. Assume pitch line velocity as 5 m/s. Recommended series of module: 7 or 9. **[8]**

Q5) a) Derive expression for wear strength of helical gears. **[8]**

OR

a) Explain with neat sketch the concept of virtual number of teeth and its significance in the design of helical gear.

b) A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and the normal pressure angle is 20°. The normal module is 3mm. Calculate **[10]**

i) The transverse module
ii) The transverse pressure angle
iii) The axial pitch
iv) The pitch circle diameters of the pinion and the gear
v) The centre distance and
vi) The addendum and dedendum circle diameter of the pinion

Q6) a) Explain with neat sketch the force analysis of bevel gear. **[8]**

OR

a) Explain the strength rating of worm gearing.

b) A pair of worm gears is designated as 1/30/10/8 Calculate **[8]**

i) The centre distance
ii) The speed reduction
iii) The dimensions of the worm and
iv) The dimensions of the worm wheel

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Total No. of Pages : 2

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T.E. (Mechanical) (Part - III) (Semester - VI) (New) (Revised) Examination, November - 2017

INTERNAL COMBUSTION ENGINES

Sub. Code: 66841

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt all the questions.**

2) **Make suitable assumptions if necessary and clearly mention them.**

3) **Figure to right indicate full marks.**

Q1) a) Define the following terms **[8]**

i) Clearance volume.

ii) Swept volume.

iii) Thermal efficiency.

iv) Air standard efficiency.

OR

b) Classify IC Engine and explain each type with examples. **[8]**

c) Explain with neat sketch port timing diagram for two stroke petrol engine. **[8]**

Q2) a) A four cylinder, four stroke square engine running at 40 rev/sec has a carburetor venturi with a 3 cm throat. Assuming the bore to be 10 cm, volumetric efficiency of 75%, the density of air to be 1.15 kg/m^3 and coefficient of air flow to be 0.75. Calculate, **[9]**

i) Engine volume sucked per second and mass flow rate.

ii) Suction pressure at throat.

b) Explain the following terms. **[9]**

i) Air fuel ratio and its types.

ii) Air fuel requirements for SI engine.

iii) Petrol injection in SI engine.

OR

c) Explain the injection nozzles used in CI engine and its types. **[9]**

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Q3) a) Write types of combustion chamber for SI engine and explain requirements of Combustion chamber. **[8]**

OR

b) Explain the factors influenced of engine variable on flame speed. **[8]**

c) Explain the effect of various engine variables on detonation. **[8]**

Q4) a) What modification is required, if the existing engine is to be supercharged? What are various methods of turbo charging? **[8]**

b) Explain with figure abnormal combustion in CI engine. Discuss for the control of knocking for CI engine. **[8]**

Q5) a) Discuss the various pollution norms and devices used for the control of engine emissions. **[8]**

b) What do you mean by induction swirl in combustion chamber of C I Engines? Discuss the advantages and disadvantages of the induction swirl. **[8]**

OR

b) What are the different methods to measure frictional power of ic engines. Explain Morse test. **[8]**

Q6) a) List the advanatges and disadvantages of supercharging of diesel engine. **[7]**

OR

a) Describe the sources for the production of Biodiesel and its advantages for utilization in IC engines. **[7]**

b) A four stroke petrol engine develops 50 kW and consumes 16 liters of petrol per hour of specific gravity 0.755. The calorific value of fuel used is 44500kJ/kg. Find its indicated thermal efficiency. If engine runs at 3000 rpm. It develops the mean effective pressure of 5.2 bar. Determine the bore and length of stroke if stroke length is 1.1X bore. **[7]**

c) Write notes on HC Emission and their control. **[4]**

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Total No. of Pages : 3

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

MACHINE TOOLS & PROCESSES

Sub. Code : 63364

Day and Date : Tuesday, 07 - 11 - 2017

Time : 10.00 a.m. to 01.00 p.m. **Total Marks : 100**

Instructions : 1) All Questions are compulsory.

2) Figures to the right indicate full marks

3) Assume suitable data, if necessary.

4) Use of Non-programmable Scientific Calculator is allowed.

Q1) Attempt any four (4 marks each) :

a) Explain the properties of molding sand . Suggest the methods to measure the same. [4]

b) State the function of riser in the gating system. [4]

c) What are the steps involved in gravity die casting. [4]

d) Draw neat sketch of cupola furnace and name the parts. [4]

e) List the defects related to molding process? Explain any two of them. [4]

Q2) Attempt any four (4 marks each) .

a) Briefly explain principle of rolling with neat sketch. [4]

b) Distinguish between open and closed die forging processes. [4]

c) Show by schematic sketches the process of forward extrusion. Give two examples of components produced by extrusion. [4]

d) Why is lubrication difficult in wire drawing process? State the methods generally employed in it. [4]

e) Indicate by means of flow diagram the different stages in manufacture of 50 mm diameter rod from a steel ingot. [4]

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Q3) Write a short note on (Any Three) :

a) Advantages and Limitations of sand casting process [6]

b) Defects in forging [6]

c) Injection molding [6]

d) Thermoforming process for plastic [6]

Q4) Attempt any four (4 marks each)

a) A lathe is provided with a change gear set from 20 to 125 teeth in steps of 5 teeth and an additional gear of 127 teeth. Find the gear train for cutting metric thread of 3 mm pitch on a lathe having lead screw pitch as 6 TPI. [4]

b) How are a capstan and turret lathe headstock classified? Describe any one of them. [4]

c) Describe in brief working principle of boring machine. [4]

d) Draw neat sketch of following operations performed on drilling machine. [4]

i) Countersinking

ii) Counterboring

e) Give the specification of lathe. [4]

Q5) Attempt any four (4 marks each) :

a) Explain the method of carrying out an operation on shaper. [4]

b) Outline the procedure of planning vertical surfaces. [4]

c) Make a neat sketch of Universal milling machine. State its advantages. [4]

d) What are various tool holding devices used on milling machine? [4]

e) Compare the gear shaving with gear rolling. [4]

Q6) Write a short note on (Any Three) :

a) Abrasive Jet Machining advantages & limitations [6]

b) Application of Electro- Chemical machining with neat sketch [6]

c) Water jet machining process [6]

d) Various operations performed on milling machine [6]

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester-IV) (Revised) Examination, November - 2017

THEORY OF MACHINES - I

Sub. Code : 63363

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **Attempt all questions.**
2) **Figures to the right indicates full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume suitable data, if necessary and state clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) a) Write a note on Grubler's criterion for planar mechanism. **[8]**

OR

a) Explain the inversions of single-slider crank chain with neat sketches. **[8]**

b) A reciprocating engine mechanism is shown in fig.1.b. Crank OC is 60 mm long and connecting rod CP is having length of 180mm. By using Klein's construction method, find the velocity and acceleration of the piston if the crank is rotating at 180 r.p.m. **[8]**

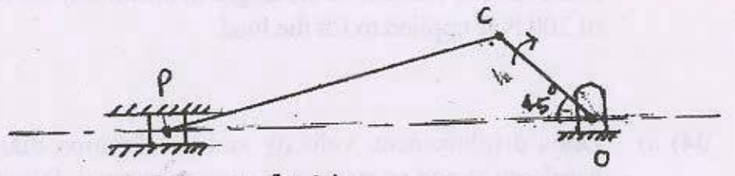


fig.1.b

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Q2) Crank OA of the quick return mechanism shown in fig. 2. revolves at a uniform speed of 250 r.p.m. in clockwise direction. The dimensions of various links are: OA = 75 mm, PQ = 375 mm, and QR = 400 mm. Crank makes 45° with vertical line PO. Find: i) velocity of R, ii) acceleration of R and iii) angular acceleration of QR. **[18]**

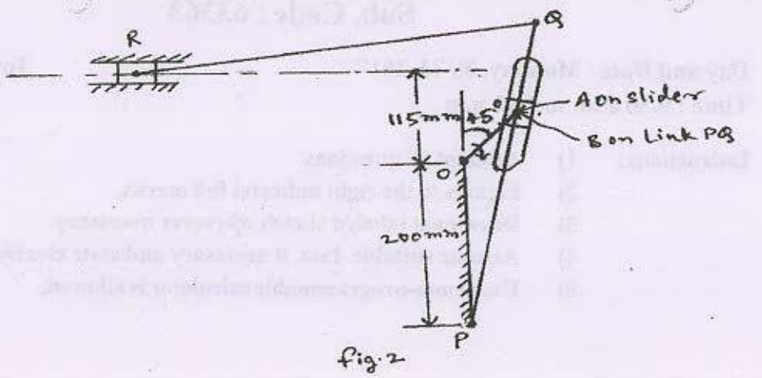


fig. 2

Q3) a) Derive the equation for friction torque in case of conical pivot bearing assuming uniform pressure with usual notations. **[8]**

OR

a) Derive the equation for friction torque in case of flat pivot bearing assuming uniform pressure condition. **[8]**

b) A screw jack has square threaded screw with mean diameter of 40 mm. The pitch of the thread is 6 mm and the coefficient of friction at the screw is 0.16. The load to be lifted is 25 kN and is supported by a collar having mean diameter of 50 mm and the coefficient of friction at the collar is 0.18. Determine the length of the tommy bar required if an effort of 200 N is applied to lift the load. **[8]**

Q4) a) Draw displacement, velocity and acceleration diagram for Uniform acceleration and retardation motion program of follower. **[4]**

b) A cam is operating an oscillating roller follower having SHM during outward and return stroke. Draw the cam profile for the following given data;

Distance of roller centre from cam centre at the start of ascent = 60 mm;

Follower arm length = 80 mm; Distance of pivot point from cam centre = 100 mm;

Angle of ascent = 60°; Angle of descent = 90°; Angle of dwell in between = 45°

Angle of oscillation of follower arm during ascent and descent = 15° **[14]**

Q5) a) Derive the equation of ratios of belt tensions in case of flat belt drive. **[6]**

OR

a) Explain slip and creep in belt. **[6]**

b) An open belt running over two pulleys 240 mm and 600 mm diameter connects two parallel shafts 3m apart and transmits 4 kW from smaller pulley that rotates at 300 rpm. Coefficient of friction between the belt and pulley is 0.3 and safe working tension is 10 N per mm width. Determine minimum width of belt, initial tension in belt. **[10]**

Q6) a) Explain controlling force and controlling curve. **[6]**

OR

a) Explain the terms height of governor, Isochronism and stability related to governor. **[6]**

b) In a porter governor, each of the four arms is 400 mm long. The upper arms are pivoted on the axis of rotation whereas the lower arms are attached to the sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and the load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of 250 mm and 300 mm of rotation of governor balls? **[10]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

ii) Discharge through nozzle = 0.18 m^3/s

iii) Area of the jet = 7500 mm^2

iv) Power available at the shaft = 44 kW

v) Mechanical efficiency = 94%

Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Seat No. [ ]

Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

ii) Discharge through nozzle = 0.18 m^3/s

iii) Area of the jet = 7500 mm^2

iv) Power available at the shaft = 44 kW

v) Mechanical efficiency = 94%

Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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Q2) a) What is governing of turbine? Explain governing of Francis turbine with neat sketch. [8]

b) An inward flow reaction turbine has outer diameter of 1m and inner diameter 0.5m. The vanes are radial at the inlet and discharge is radial at the outlet. Water enters vane at an angle of 10°. Assuming velocity of flow to be constant at 3m/sec. Find speed of the wheel and vane angle at outlet. [8]

OR

c) A Kaplan turbine works under head of 16m. Runner diameter is 2.5 times diameter of hub; speed of turbine is 105 rpm. Angle of vane tip at outlet extreme edge is 20° and K_f=0.6. [8]

Assume radial discharge.

Calculate i) Runner diameter

ii) Hub diameter

iii) Discharge through turbine

Q3) a) Define specific speed of pump and obtain expression of it. What is significance of it? [8]

b) Write short notes (any two) [10]

i) Priming and its necessity

ii) NPSH

iii) Derive expression for minimum starting speed of centrifugal pump.

OR

c) i) A centrifugal pump is running at 1000 rpm. The outlet vane angle of impeller is 45° and velocity of flow at out 2.5 m/sec. Discharge through pumps is 200 lit/sec working against total head of 20m. If manometric efficiency is 80%, find impeller diameter and width of impeller at outlet. [5]

ii) Centrifugal pump of impeller diameter 0.30m discharging 0.03 m^3/s water against a total head of 15 m and the pump is running at 1000 rpm. Find the discharge, head and ratio of power of a geometrically similar pump of diameter 0.15 m when it is running at 2500 rpm. [5]

Q4) a) Prove that the expression for volumetric efficiency in reciprocating compressor with effect of clearance volume is

$$n_v = 1 - \frac{V_C}{V_S}\left[\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} - 1\right]$$

Where,

V_c is Clearance volume, V_s is swept volume and P_2/P_1 is the pressure ratio. Also discuss the effect of Clearance ratio on the volumetric efficiency of the compressor. [8]

b) Write short notes on any two: [10]

i) Requirement of multistage of reciprocating compressors.

ii) Workdone by reciprocating compressor during adiabatic and isothermal compressions.

iii) Classification of reciprocating compressors.

OR

b) i) A single acting single stage compressor is belt driven from an electric motor at 400 rpm. The cylinder diameter is 15cm and the stroke 17.5 cm. The air is compressed from 1 bar to 7 bar and the law of compression $PV^{1.3}$ = Constant. Find the power of the motor, if transmission efficiency is 97% and the mechanical efficiency of compressor is 90%. Neglect clearance effect. [5]

ii) The pressure in the mains of compressor air service is to be 8 bar and a supply of 28 m^3/hr at 15°C and that pressure is to be maintained. The air is compressed from an initial pressure 1 bar by a two stage compressor in which the compression is adiabatic. The air is cooled to its initial temperature of 15°C in the inter cooler. What is the minimum power required to compress the air? Take R = 287 J/kgK. [5]

Q5) a) Explain the concept of Slip factor and Power input factor. [8]

b) A Centrifugal compressor delivers 40 kg of air per minute at a pressure of 3 bar and 120° C. The intake pressure and temperature of the air is 1 bar and 25°C. If no heat loss to the surrounding, find

i) Index of compression

ii) Power required, if the compression is isothermal

(Take R = 287 J/kgK and C_p = 1.005 J/kgK) [8]

OR

b) A cantilever of length 2 m carries a UDL of 2 kN/m over a length of 1 m from the free end and a point load of 1kN at the free end. Find the slope and deflection at the free end if $E=2.1\times10^5 N/mm^2$ and $I=6.667\times10^7 mm^4$ **[8]**

OR

b) State the importance of theories of failure and explain the maximum Principal stress theory. **[8]**

Q6) a) State the assumptions made in Euler's column theory and derive its expression for the crippling load when both the ends of the column are hinged. **[8]**

b) The maximum stress produced by pull in bar of length 1m is 150 N/mm^2. The area of cross sections and lengths are as shown in fig.5. Calculate the strain energy stored in a bar if $E=2\times10^5 N/mm^2$ **[8]**

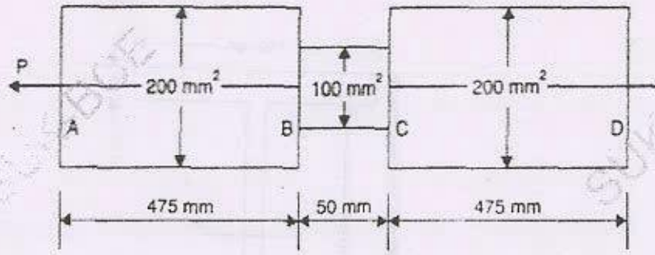


Fig. 5

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Total No. of Pages :4

Seat No.

S.E. (Mechanical) (Semester - IV) Examination, November - 2017
ANALYSIS OF MECHANICAL ELEMENTS
Sub. Code:63361

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary and state it clearly.**
3) **Figures to the right indicate full marks.**
4) **Draw neat and labeled sketches wherever necessary.**
5) **Use of non programmable calculator is allowed.**

Q1) a) Three pillars two of aluminum and one of steel support a rigid platform of 200 kN as shown in the fig.1. If area of each aluminum pillar is 1000 mm^2 and that of steel pillar is 800mm^2, find the stresses developed in each pillar.

Take$E_a = 1\times10^5 N/mm^2$ and $E_s = 2\times10^5 N/mm^2$. What additional load P, can it take, if working stresses are 65N/mm^2 in aluminum and 150N/mm^2 in steel? **[12]**

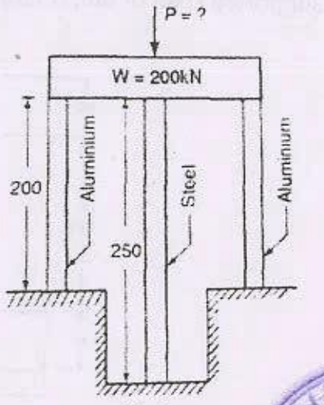


Fig.1

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b) Explain thermal stresses and hence derive the expression for thermal stress induced in a bar with its ends fixed by rigid support. **[6]**

OR

b) A hollow circular shaft 200 mm external diameter and thickness 25mm is transmitting power at 200 rpm. The angle of twist over the length of 2m was found to be 0.5°. Calculate the power transmitted and the maximum shear stress induced in the shaft. Take modulus of rigidity as 84 kN/mm² **[6]**

2) Draw SFD and BMD for loading condition shown in fig 2. Locate point of contraflecture and maximum bending moment if any. **[16]**

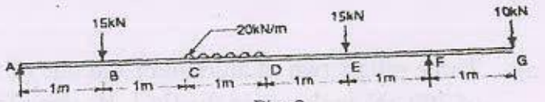


Fig. 2

)3) A cast iron beam has I section with top flange 80 mm ×40 mm, wed 120 mm ×20mm and bottom flange 160 mm×40 mm. as shown in Fig 3 if tensile stress is not to exceed 30 N/mm² and compressive stress 90N/ mm²,what is the maximum UDL the beam can carry over a simply supported span of 6m, if larger flange is in tension.

16]

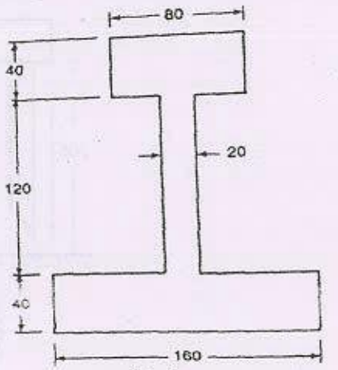


Fig. 3

4)a) Derive the expression for the principal stresses and the maximum shear stress for a member subjected to simple shear stress. Show the locations of Principal Planes and Planes of Maximum shear stress. **[9]**

b) At a point in a strained material the principal stresses are 140N/mm² (tensile) and 60 N/mm² (compressive). Determine the normal stress, shear stress and the resultant stress on a plane inclined at 45°to axis of major Principal stress. What is the intensity of maximum shear stress at the point? **[9]**

OR

b) An I-section beam 350mm ×150mm has a wed thickness of 10mm and a flange thickness of 20mm.(Fig.4) If the shear force acting on the section is 40 kN, find the maximum shear stress developed in the I-section. Also sketch the shear stress distribution across the section. **[9]**

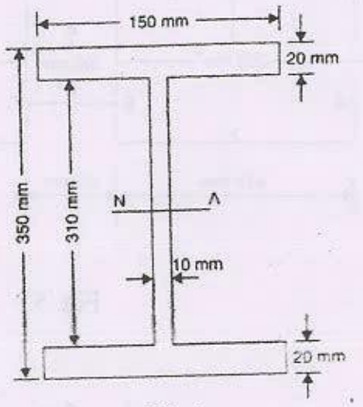


Fig.4

Q5) a) Derive the expression for slope and deflection of a simply supported beam subjected to an UDL for the whole span, using double integration method. **[8]**

Seat No.

S.E. (Mechanical Engineering) (Semester - III) (Revised)
Examination, November - 2017
FLUID MECHANICS
Sub. Code : 63354

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Neat diagrams must be drawn wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of non programmable calculator is allowed.**
5) **Assume suitable data if necessary.**

Q1) a) Define viscosity, surface tension and capillarity and write their units in S.I. system. **[6]**

b) A thin square plate 1m × 1m is placed horizontally at the centre in a horizontal gap of height 2 cm filled with oil of viscosity 10 poise. The plate is pulled at a constant velocity of 0.1 m/s. Find the force on the plate.

If the gap is now filled with another oil. When the plate is placed at a distance of 0.5 cm from one of the surfaces of the gap and pulled with the same velocity, if the force on the plate remains same as before, find the viscosity of the new oil. **[6]**

c) Define Buoyancy and meta centre. **[4]**

Q2) a) Distinguish by giving examples, Laminar and Turbulent flow, Steady and Unsteady flow, Uniform and Non uniform flow and Compressible and Incompressible flow. **[8]**

b) Solve any one of the following : **[8]**

i) Find the value of a such that the flow field given by

$V = (axy - z^3)i + (a - 2)x^2j + (1 - a)xz^2k$ is irrotational.

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ii) An air plane flies at an altitude where the pressure and density of air are 40 KN/m² and 0.58 Kg/m³ respectively. If the stagnation pressure measured by a pitot tube is 57 KN/m², compute the speed of the aeroplane and the stagnation temperature and stagnation density. Take R = 287J/Kgk and ratio of specific heats is 1.4.

3) a) i) Bernoulli's theorem is based on which principle? Give its statement. Name three devices where Bernoulli's equation is applied. [4]

ii) Derive an expression for discharge over a triangular notch in terms of head of liquid over the crest of the notch and the included angle. [5]

b) Solve any one of the following : [9]

i) A venturimeter is used for the measurement of discharge of water in a horizontal pipeline. The pipe diameter is 20 cm and the throat diameter is 12 cm. When the flow of 130 lit/sec is flowing, the attached manometer shows a head difference of 50 cm if the coefficient of discharge of the venturimeter is 0.98 find the density of manometric fluid in the manometer.

ii) A circular tank of diameter 3 mt contains water up to a height of 4 mt. If the water is discharged through a 10 cm diameter orifice at the bottom of the tank, find the height of water above the orifice after 5 minutes Assume coefficient of discharge of orifice is 0.63.

4) a) i) Discuss the applications of momentum equation. [4]

ii) Explain with a neat sketch how pitot tube is used to measure discharge through pipe. [4]

b) An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drop in 100 mt. length of the pipe is 1800 KN/m² determine [8]

i) Wall shear stress and frictional drag for 100 mt. length.

ii) Power required to maintain the flow.

iii) The velocity gradient at the pipe wall.

iv) The velocity and shear stress at 8 mm from the wall.

5) a) i) Explain the concept of equivalent pipe. [5]

ii) Discuss the causes of minor energy losses in flow through pipes. [4]

b) Solve any one of the following : [9]

i) Three pipes of diameters 30 cm, 20 cm and 40 cm and lengths 450 mt, 255 mt and 315 mt respectively are connected in series. The difference in water surface levels in two tanks is 18 mt. Determine the rate of flow of water if coefficients of friction are 0.0075, 0.0078 and 0.0072 respectively considering

A) Minor losses also B) Neglecting minor losses.

ii) A horizontal pipe line 15 cm in diameter is joined by sudden enlargement to 25 cm diameter pipe. Measurements indicate that when flow is from smaller to larger cross section the head loss is 0.5 mt in excess of that when the flow takes place from larger to smaller section. Determine flow rate. Take coefficient of contraction $C_c = 0.63$.

6) a) What do you mean by boundary layer separation? Why does it occur? With neat sketches explain the methods used to control the separation of boundary layer. [8]

b) Solve any one of the following : [8]

i) A geometrically similar model of an air duct is built to 1 : 25 scale and tested with water which is 50 times more viscous and 800 times denser than air. When tested under dynamically similar conditions the pressure drop is 2 bar in the model. Find the corresponding pressure drop in the full scale prototype.

ii) Define pressure drag and skin drag or shear drag. A 2.5 mt long body having a projected area of 2.4 m² normal to the direction of motion is having a viscosity of 0.0012 Ns/m². Find the drag on the body if it has drag coefficient of 0.45 for Reynolds number of 7×10^6.

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SF-80

Total No. of Pages : 3

Seat No.	

S.E. (Mech) (Part - II) (Semester-III) (Revised)
Examination, November - 2017
METALLURGY
Sub. Code : 63353

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any three questions from each section.**
2) **Answers for both sections to be written in the same answer book.**
3) **Figures to the right indicate full marks.**
4) **Draw neat figures wherever necessary.**

SECTION-I

Q1) Answer any three of the following. Each question carries equal marks. **[18]**

a) With neat sketches. Explain the process of Solidification by nucleation, crystallization and growth.

b) Explain the phenomenon of coring using equilibrium diagram? How can be cored structures avoided or eliminated?

c) Draw a typical equilibrium diagram for impure/ partial eutectic systems and explain the cooling and solidification of any hypoeutectic alloy from above melting temperature to room temperature and draw the room temperature structure.

d) Draw the crystal structures of BCC and FCC and evaluate the number of atoms per unit cell for both.

Q2) a) Draw Fe-Fe_3C equilibrium diagram. Indicate all the phases. Temperatures and Compositions. **[8]**

b) What is SG Iron? Explain the process of manufacturing SG Iron. Draw the microstructure of SG iron and Gray Cast iron and compare their properties. **[8]**

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Q3) a) Draw typical equilibrium diagram of A1-Cu alloy system? Explain the process of precipitation hardening treatment and its effects. Write the applications. [7]

b) Draw self explanatory sketches of any three. [9]

i) Substitutional and interstitial type solid solution.

ii) Microstructure of white and malleable cast irons.

iii) Microstructure of 0.4 and 1.2% carbon steel .

iv) Microstructure of 70:30 brass as cast and annealed

v) X-ray Radiography.

vi) SN curve and Creep curve.

Q4) Write short notes on any four. [16]

a) Solid solutions.

b) Tool steels.

c) Ferritic Stainless steels.

d) Dye Penetrant Testing.

e) Impact Testing.

SECTION-II

)5) a) Draw flowchart for carbide cutting tools manufactured by powder metallurgy techniques, why pre-sintering is necessary in such tools? [9]

b) Classify different types of heat treatment furnaces? Explain rotary hearth furnace with neat sketch? [9]

6) a) Explain precipitation in A1–Cu alloys with respect to composition, aging time and temperature, over-aging? [8]

b) Classify case carburizing methods? Explain pack carburizing with neat sketch. [8]

Q7) Differentiate clearly between any four of the following. [16]

a) Hardening and Tempering.

b) Flame and Induction hardening.

c) TTT and CCT curves.

d) Pearlite and ferrite.

e) Annealing and normalizing.

Q8) Write short notes on any four of the following. [16]

a) Liquid phase sintering.

b) Induction hardening.

c) heat treatment defects.

d) Bainitic transformation.

e) Self lubricating bearing.

✡ ✡ ✡

)6) a) Define the following as related to steam turbine. [8]

i) Speed ratio

ii) Blade velocity coefficient

iii) Diagram efficiency

iv) Stage efficiency

OR

Explain the pressure compounding of impulse turbine showing pressure and velocity variations along the axis of the turbine.

b) The following particulars refer to a stage of a Parson's turbine comprising one ring of fixed blades and one ring of moving blades.

Mean diam. of blade ring = 70 cm

Speed of turbine = 3000 rpm

Steam velocity at exit from blade = 160 m/s

Blade outlet angle = 20°

Steam flow rate = 7 kg/s

Draw velocity diagram & find

i) Blade inlet angle

ii) Tangential force

iii) Power developed

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Total No. of Pages : 4

Seat No.

S.E. (Mech.) (Part - II) (Semester - III) Examination, November - 2017

APPLIED THERMODYNAMICS

Sub. Code: 63352

)ay and Date :Wednesday, 15 - 11- 2017 Total Marks : 100

'ime :10.00 a.m. to 1.00 p.m.

nstructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Draw neat sketch wherever necessary.
5) Use of steam table, mollier chart and non-programmable calculator is allowed.

)1) a) State and prove Carnot Principle. [8]

OR

b) Prove that Entropy of an isolated system during a process always increases. [8]

c) An insulated cylinder of volume capacity 4 m^3 contains 20 kg of nitrogen. Paddle work is done on the gas by stirring it till the pressure in the vessel gets increased from 4 bar to 8 bar. Determine change in entropy. Take for nitrogen C_p = 1.04 kJ/kgK and C_v = 0.7432 kJ/kgK. [8]

Q2) a) Write a note on steam tables and Mollier chart. [8]

OR

b) Write a note on Reheat and Regenerative steam power cycles. [8]

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c) A steam turbine receives steam at a pressure of 20 bar and superheated to 87.6°C. The exhaust pressure is 0.07 bar and the expansion of steam takes place isentropically. Calculate following using steam table **[10]**

i) Heat supplied

ii) Heat rejected

iii) Net work done

iv) Thermal efficiency

v) SSC.

3) a) Classify boilers. Compare water tube boilers with fire tube boilers. **[8]**

OR

b) What is function of air pump in condenser? Explain with neat sketch working of Edward's air pump. **[8]**

c) A prime mover uses 15,000 kg of steam per hour develops 2450 kW. The steam is supplied at 30 bar and 350°C. The exhaust from the prime mover is condensed at 725 mm of Hg when barometer reads 755 mm of Hg. The condensate temperature from the condenser is 31°C and the rise in circulating water temperature is 10°C. Determine: **[8]**

i) The quality of steam entering the condenser.

ii) The quantity of circulating water required.

iii) Cooling ratio.

Assume that no air is present in the condenser.

4) a) What is the function of the nozzle? Describe different types of steam nozzles with suitable sketch. **[8]**

OR

b) Explain the terms, degree of under cooling and degree of super saturation. What are the effects of supersaturation? **[8]**

c) Steam at a pressure of 15 bar and dryness fraction 0.97 is discharged through a convergent- divergent nozzle to a back pressure of 0.2 bar. The mass flow rate is 9 kg/kwh. If the power developed is 220 kW. Determine **[8]**

i) Throat pressure.

ii) Number of nozzles required if each nozzle has a throat of rectangular cross section of 4 mm × 8 mm.

5) a) Classify the turbines and compare impulse turbine with reaction turbine. **[8]**

b) A impulse turbine has exit steam velocity from a nozzle equal to 900 m/s. The nozzle makes an angle of 20° to the tangent of the rotating wheel. The main blade speed is 300 m/s. The blades are equiangular. The mass of steam flowing through the turbine is 1200 kg/hr. Calculate **[9]**

i) The blade angles.

ii) The blade efficiency.

iii) The power developed.

Take blade velocity co-efficient = 0.85.

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SF-78

Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Semester - III)
Examination, November - 2017
ELECTRICAL TECHNOLOGY
Sub. Code : 63351

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate marks.**
3) **Draw neat figures wherever necessary**
4) **Assume suitable data, if missing. State it clearly.**

SECTION - I

Q1) a) Derive the expression for speed and torque of dc motor. **[1 × 8]**

OR

Draw circuit diagrams and torque speed characteristics of dc shunt motor, dc series motor and dc cumulative compound motor.

Answer any two of the following (b, c, d). **[2 × 6]**

b) Draw the diagram and explain the working of 4 point starter.

c) Explain the basic methods of electric braking of dc motor.

d) A DC series motor runs at 1200 rpm driving a constant torque load by taking 10 A current from 200V supply. Now 5 ohm resistance is connected in series with the motor. Find the new armature current and new speed. The armature resistance is 0.6 ohm. Field resistance is 0.5 ohm.

Q2) Answer any TWO **[2 × 8]**

a) State three advantages of using 3 phase induction motor rather than dc motor. Describe the construction of cage type rotor.

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b) Torque of 3 phase induction motor is given by $\frac{120\, s\, E_2^2\, R_2}{2\pi N_s \left(R_2^2 + S^2\, X_2^2\right)}$

where E_2 ,R_2, X_2 , s, N_s are rotor induced emf per phase at standstill, Rotor resistance per phase, Rotor reactance per phase at standstill, slip and synchronous speed respectively. Write the value of slip and expression for torque at

i) Starting

ii) When the torque is maximum

iii) If rotor speed=Synchronus speed.

c) A 4 pole, 230V, 50Hz, 3 phase induction motor draws 10A at ( ) pf while running at 1450rpm. The stator loss is 100W, frictional loss is 100W. Find the rotor Cu loss. Neglect the rotor iron loss and find efficiency of the motor.

Q3) Answer any TWO **[2 × 8]**

a) Why DOL starter should be used for small rating motors? Describe DOL starter for 3 phase induction motor.

b) Describe rotor side speed control methods of 3 phase induction motor.

c) Explain the 'constant v/f' speed control method. Why it is the most popular method these days?

SECTION - II

Q4) Answer any TWO **[2 × 8]**

a) What are the desirable properties of servo motor? Describe methods of controlling dc servo motor.

b) Describe a linear induction motor. State its applications.

c) State advantages of brushless dc motor over conventional de motor. How is commutation obtained in BLDC motor?

Q5) Answer any TWO **[2 × 8]**

a) Explain the factors to be considered for selecting a motor for a particular drive.

b) Explain with examples the terms- active load, passive load, multimotor drive.

c) Classify mechanical loads based on how the torque requirement changes with driving speed. Explain.

Q6) Answer any TWO **[2 × 8]**

a) Compare direct arc type furnace with indirect arc furnace in all aspects.

b) Describe the set up and operation for eddy current heat treatment of metallic parts.

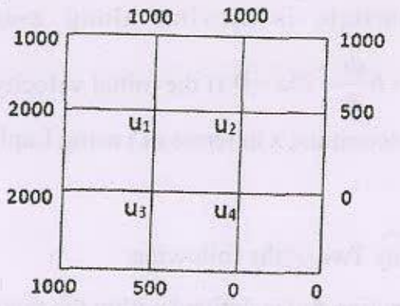
c) A 200 kW resistance oven is to be operated in such a way that its maximum temperature is not to exceed 1700°C. The initial temperature of the charge is 420°C. If heating element is a wire of diameter 0.6 cm is used, find the length required. Also find resistance of heating element.

Radiating efficiency =0.5, Emissivity = 0.5, Specific resistance of heating element= 150×10^{-6} ohm-cm.

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iv) $u(x, \infty)$ is finite

b) Solve the Laplace equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown in figure by Gauss-Siedal iterative method by per. [16]



Total No. of Pages : 4

Seat No.

S.E. (Mechanical Engg.) (Semester - III) (Revised) Examination, November - 2017

ENGINEERING MATHEMATICS - III

Sub. Code : 63350

Day and Date : Friday, 10 - 11 - 2017 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.
4) Assume suitable data if necessary.

SECTION - I

Q1) Attempt any Three of the following.

a) Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 3\sin x + 4\cos x$ with $y(0) = 1$ and $y'(0) = 0$. [6]

b) Solve $(D^2 + D+1)y = (1- e^x)^2$ [6]

c) Solve $(D^2 +5D + 4)\, y = 3 - 2x$ [6]

d) Solve $x^2\frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = e^x$. [6]

Q2) Attempt any one of the following.

a) The whirling speed of a shaft of length l is given by $\frac{d^4y}{dx^4} - a^4y = 0$,

where $a^4 = \frac{Ww^2}{gEI}$ and y is the displacement at distance x from one end. If the ends of the shafts are considered in long bearing so that the slope at each end is zero, show that the shaft will whirl when cos al cosh al =1. [16]

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b) i) The motion of particle is given by $\frac{d^2s}{dt^2}+k^2\frac{ds}{dt}=0$. At $t = 0$, $s=s_0$ and $\frac{ds}{dt}=v_0$ show that as time $t\to\infty, s=s_0+\frac{v_0}{k^2}$ **[8]**

ii) A spring for which stiffness K = 700 Newton / m hangs in a vertical position with its upper end fixed. A mass of 7 kg is attached to the lower end. After coming to rest, the mass is pulled down to 0.05 m and released Discuss the resulting motion of the mass, neglecting air resistance. **[8]**

Q3) Attempt any two of the following.

a) If $\vec{a}$ is a constant vector, $\vec{r}=x\vec{i}+y\vec{j}+z\vec{k}$ and $r=\sqrt{x^2+y^2+z^2}$ then find

i) $\nabla.\left(\frac{\vec{a}\times\vec{r}}{r}\right)$ and show that ii) $\nabla r^n=nr^{n-2}\vec{r}$ **[8]**

b) Show that $\vec{F}=(z^2+2x+3y)\vec{i}+(3x+2y+z)\vec{j}+(y+2xz)\vec{k}$ is irrotational but not solenoidal and hence find scalar potential **[8]**

c) Find the directional derivative of $\phi=x^2+2y^2-3z^2$ at (1, 2, 1) in the direction **[8]**

i) Normal to $xy^2+yz^3=4$ at (1, –1, 1)

ii) tangent to $x=t^2+t, y=2t, z=2-t$ at $t=1$

SECTION - II

Q4) Attempt any three from the following:

a) Find the Laplace transform of $\frac{d}{dt}\left(\frac{\sin t}{t}\right)$ **[6]**

b) Find $L\left\{\int_0^t x\cosh x dx\right\}$ **[6]**

c) Find inverse Laplace transform of $\log\left(1+\frac{a^2}{s^2}\right)$ **[6]**

d) A particle is moving along x-axis according to the law $\frac{d^2x}{dt^2}+6\frac{dx}{dt}+25x=0$. If the initial velocity is 12 meters per second to the left, determine x in terms of t using Laplace transform method. **[6]**

Q5) Attempt any Two of the following:

a) A function $f(x)$ is defined within the range $(0, 2\pi)$ as **[8]**

$$f(x)=\begin{cases}x & \text{if } 0<x<\pi\\ 2\pi-x & \text{if } \pi<x<2\pi\end{cases}$$

Express f(x) as a Fourier series in the range $(0, 2\pi)$

b) Find Fourier series with period 3 to represent $f(x) = 2x - x^2$ in the range $(0, 3)$ **[8]**

c) Find half range cosine series for $f(x) = \sin x$ in the range $(0, \pi)$ and hence deduce that $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots\ldots=\frac{\pi}{4}$. **[8]**

Q6) Attempt any one from the following.

a) Solve $\frac{\partial u}{\partial t}=a^2\frac{\partial^2 u}{\partial x^2}$ if $u(x, t)$ satisfies the following conditions. **[16]**

i) $u(0, t) = 0$ for all t

ii) $u(l, t) = 0$ for all t

iii) $u(x,0)=\begin{cases}x & \text{if } 0\le x\le l/2\\ l-x & \text{if } l/2\le x\le l\end{cases}$

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Total No. of Pages : 2

Seat No.	

B.E. (E & Tc) (Semester-VIII) Examination, November - 2017
OPERATING SYSTEM (Elective - II)
Sub. Code : 67822

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are Compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume data wherever necessary.**

SECTION-I

Q1) Attempt any two: **[16]**

a) What is a bootloader and explain in detail?

b) Draw and explain complete set of process state transitions?

c) Explain semaphore. How mutual exclusion can be achieved using semaphore?

Q2) Attempt any two: **[16]**

a) How do you prevent deadlock in taking place.

b) Draw the static & dynamic components of a process.

c) Draw & briefly explain the block diagram of System Kernel?

Q3) Write short notes on any three: **[18]**

a) The logical format of executable file.

b) Deadlock and starvation.

c) System calls.

d) Messaging.

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SECTION-II

Q4) Attempt any two: [16]

a) Explain in detail dynamically partitioned memory allocation scheme?

b) Explain in detail interrupt driven I/O system.

c) Draw the block diagram of Unix system kernel? Explain File subsystem & process control block?

Q5) Attempt any two: [16]

a) List the different reasons or cases for which kernel has to swap process out? Explain swapping process out?

b) Explain real time systems.

c) Explain working of page stealer process.

Q6) Attempt any three: [18]

a) Allocation of frames.

b) Fragmentation.

c) Kernel I/O subsystem.

d) Page fault.



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Seat No.	

B.E. (E & TC) (Part - IV) (Semester - VII) (Old)
Examination, November - 2017
WIRELESS COMMUNICATION (Pre Rev)
Sub. Code : 47927

Day and Date : Monday, 13 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION - I

Q1) Attempt any two **[2 × 8 = 16]**

a) What is WLL? Explain in detail.

b) Explain the concept of frequency reuse.

c) Compare 2G and 3G wireless network.

Q2) Attempt any two **[2 × 8 = 16]**

a) Explain in detail two - ray ground reflection model.

b) Explain diffraction and scattering in mobile radio propagation.

c) Write a note on Fading effects due to Doppler spread.

Q3) Attempt any two **[2 × 9 = 18]**

a) Derive the equation for free space propagation model.

b) Explain Small - Scale multipath measurements.

c) Explain in detail Rayleigh & Ricean distribution.

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SECTION - II

Q4) Attempt any two **[2 × 8 = 16]**

a) Compare FDMA & TDMA.

b) Explain any two spread spectrum multiple access.

c) Discuss signalling system 7.

Q5) Attempt any two **[2 × 8 = 16]**

a) Explain Global System for mobile

b) Explain IEEE - 802.11 standards.

c) Explain DECT functional concept.

Q6) Write a note on any three **[3 × 6 = 18]**

a) Personal Communication Services.

b) ISDN

c) X.25 Protocol

d) Network access protocol.

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Total No. of Pages : 2

B.E. (E&TC) (Part -II) (Semester - VIII) Examination, November - 2017

MOBILE COMMUNICATION (Elective -II) (Pre-Revised) (Old)

Sub. Code : 49521

Day and Date :Monday, 06 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) Solve any two. **[16]**

a) Explain in detail HSCSD (High speed Net. Switched Data) in GSM.

b) Draw and explain dial-vp data connection in an analog cellular network.

c) What is meant of bine-tooth? Describe in detail bine-tooth technology

Q2) Solve any two. **[16]**

a) Draw and explain CDPD-Network architecture.

b) Explain FHSS and DSSS offered by IEEE 802.11.

c) Explain packet switched data services on cellular network.

Q3) Write notes on any three. **[18]**

a) Wireless ATM

b) IP packet delivery

c) Minimal encapsulation

d) Mobile and wireless devices

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SECTION - II

Q4) Solve any two. **[16]**

a) Explain TCP over 2.5/3G wireless network. What characteristics have to be considered and configuration parameters to adopt TCP?

b) How and why does I-TCP isolates problems on the wireless link? What are the main drawbacks of this solution?

c) Explain security services in wireless system.

Q5) Solve any two. **[16]**

a) Explain Transmission/Time out freezing and selective retransmission.

b) Draw WAP push architecture and explain various protocols used in Push architecture.

c) Explain with neat diagram WTLS secure session establishment and datagram transfer.

Q6) Write notes on any three. **[18]**

a) Advantages and disadvantages of VPN

b) File systems

c) Sync. ML.

d) W.W.W.

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Seat No.	

B. E. (Electronics & Telecommunication Engineering) (Semester - VII) Examination, November - 2017

EMBEDDED SYSTEM (Revised)

Sub. Code : 67629

Day and Date : Monday, 13 - 11 - 2017

Time : 02.30 p.m. to 05.30 p.m. **Total Marks : 100**

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Assume suitable data if necessary.

Q1) Attempt any two of the following : **[2 × 8 = 16]**

a) Draw and Explain Pin out diagram of PIC Microcontroller.

b) Explain with example Direct and Indirect addressing accessing in PIC Microcontroller.

c) Write assembly program to generate a square wave at RB1 pin with 50% duty cycle.

Q2) Attempt any two of the following : **[2 × 9 = 18]**

a) Draw and Explain Capture Mode of PIC16F877 also explain CCPxCON Register.

b) Draw and Explain block diagram of Timer 0 of PIC16F877 also explain OPTION register related to Timer 0.

c) Explain I^2C and SPI mode of serial communication in PIC16F877.

Q3) Attempt any two of the following : **[2 × 8 = 16]**

a) Define Embedded System and explain components of an Embedded System.

b) Explain embedded software development process and tools.

c) Discuss Hardware-Software design and co-design issues.

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Q4) Attempt any two of the following : **[2 × 8 = 16]**

a) Explain the RISC architecture design philosophy.

b) Explain the concept of pipeline in ARM7 along with example.

c) Explain various modes of operation of CPU in ARM7.

Q5) Attempt any two of the following : **[2 × 9 = 18]**

a) Write the features of timers in LPC2148. Also give the names and use of all SFR's required for configuring timer module in LPC2148.

b) Write an embedded C program for LPC2148 to toggle the LED's connected to pins P0.4 to P0.7 for five times.

c) Write the features of IO ports in LPC2148. Also give the names and use of all SFR's required for configuring IO ports in LPC2148.

Q6) Attempt any two of the following : **[2 × 8 = 16]**

a) Explain with pseudo code, the Round Robin software architecture.

b) What is Task? Draw and explain Task state diagram.

c) What is a re-entrant function, explain with example? Also list the precautions that must be taken while using semaphores.

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B.E. (Electronics and Telecommunication) (Semester - VII) Examination, November - 2017

COMPUTER COMMUNICATION NETWORKS (New)

Sub. Code : 67630

Day and Date : Wednesday, 15 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions :
1) **All questions are compulsory**
2) **Figures to the right indicate full marks.**
3) **Draw diagrams wherever necessary.**
4) **Assume suitable data if necessary.**

SECTION - I

Q1) Attempt any TWO from THREE **[16]**

a) Compare OSI & TCP/IP reference model.

b) Explain categories of networks.

c) Explain different framing Methods in DLL?

Q2) Attempt any TWO from THREE **[16]**

a) Define Hamming Distance. Explain Hamming Code used as Error-Correcting Code.

b) Explain CSMA protocols.

c) Explain Go-back-N protocol.

Q3) Write note on any THREE **[18]**

a) Networking Devices

b) Modem standards.

c) Guided Media

d) HDLC frame format

e) Gigabit Ethernet

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SECTION - II

Q4) Attempt any TWO [16]

a) Explain open loop congestion control.

b) What is ICMP? Explain error reporting messages in ICMP.

c) Explain RSA algorithm.

Q5) Attempt any TWO [16]

a) Compare Virtual Circuits and Datagram.

b) Explain symmetric key cryptography.

c) Explain Distance Vector Routing algorithm with suitable example.

Q6) Write a short note on - (any THREE) [18]

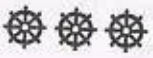
a) Choke packets

b) UDP header format

c) ARP

d) Digital Signature

e) Flooding



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Total No. of Pages :2

Seat No.	

B.E. (Part - IV) (Electronics & Telecom. Engg.) (Semester - VII) Examination, November - 2017

RF & MICROWAVE ENGINEERING (Revised)

Sub. Code : 67631

Day and Date : Tuesday, 21- 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m to 05.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) Attempt any two of the following:

a) Derive field equation for TE mode in rectangular wave guide. Show that TE_{10} is dominent mode. **[8]**

b) The TE_{10} mode is propagated in a rectangular waveguide of dimensions a = 6cms and b=40cms.By means of a travelling detector, the distance between a maximum and minimum is found to be 4.55 cm. Find the frequency of the wave. **[8]**

c) Explain power losses in waveguide. **[8]**

Q2) Attempt any two of the following:

a) Explain isolators with constructional details and how faradays rotation in ferrites is used as advantage in construction & isolator. **[8]**

b) With & matrix explain magic tee. **[8]**

c) Explain types & working of directional coupler with S parameters. Mention its application. **[8]**

Q3) Attempt any two of the following:

a) A two cavity klystron amplifier has the following characteristics voltage gain = 15db, Input power = 5mw Rsh of input cavity = 30 kΩ, RL (Load impedance) = 40 kΩ determine 1) The input rms voltage 2) the output rms voltage 3) the power delivered to the load. **[9]**

b) Differentiate between TWT and Klystron. **[9]**

c) Explain magnetron construction, working and types. **[9]**

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SECTION - II

Q4) Solve any two.

a) Explain with diagram IMPATT Diodes. [8]

b) Explain Tunnel diode with energyband diagram. [8]

c) What is Gunn effect? Explain using two valley theory. [8]

Q5) Solve any two.

a) Explain Industrial scientific-medical (ISM) applications of Microwave. [8]

b) Two identical 30dB directional couplers. are used to sample incident and reflected power in a waveguide. VSWR.=2 and the output of the coupler sampling Incident power = 4.5 mw. What is the value of reflected power? [8]

c) Explain different microwave power measuring techniques. Also explain how to measureVSWR using different techniques. [8]

Q6) Solve any two.

a) Write a note on materials for MMIC. [9]

b) Explain microwave hazards HERO, HERF and HERP. [9]

c) Explain different MMIC fabrication techniques and also explain thin film formation in monolithic microware integrated circuit. [9]

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Total No. of Pages : 2

B.E. (Electronics & Telecommunication Engineering)
(Semester - VII) Examination, November - 2017
ROBOTICS (Elective - I)
Sub. Code : 67632

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figure to right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) Attempt Any TWO of the following **[2 × 8 = 16]**

a) Explain Power Transmission system in detail.

b) Explain in detail classification of robot by Control Method.

c) Explain basic control system model with Transfer function and Block Diagram.

Q2) Attempt Any THREE of the following **[3 × 6 = 18]**

a) Explain Accelerometer Sensor.

b) Explain history of Robotics.

c) Explain Control System Analysis.

d) Explain Slip sensor & Tactile sensor.

Q3) Attempt Any TWO of the following **[2 × 8 = 16]**

a) Explain in detail classification of robot by Co ordinate system Method.

b) Explain Proximity Sensor in detail.

c) Explain optical Position Sensor

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Q4) Attempt Any TWO of the following [2 × 8 = 16]

a) Explain Application of robot in Machine Loading and Unloading.

b) Explain mechanical gripper in detail.

c) Explain significance of WAIT, SIGNAL and DELAY commands using suitable example.

Q5) Attempt Any THREE of the following [3 × 6 = 18]

a) Explain generation of robot programming Language in detail.

b) Explain Robot End Effectors Interface.

c) Explain Textual Robot Language.

d) Explain Consideration in Gripper Selection & design.

Q6) Attempt Any TWO of the following [2 × 8 = 16]

a) Explain Application of robot in Spray coating.

b) Explain Lead Through Programming Method.

c) Explain Spot Welding.

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Total No. of Pages :2

Seat No.	

B.E. (Electronics & Telecommunication) (Semester - VIII) (Revised) Examination, November - 2017

DIGITAL IMAGE PROCESSING

Sub. Code: 67818

Day and Date :Friday, 03 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) Attempt any two of the following: **[2×8=16]**

a) Explain basic concept of sampling and quantization of images to convert in digital form.

b) Draw the structure of human eye and explain elements of visual perception.

c) Explain the components of image processing system with neat block diagram.

Q2) Attempt any two of the following: **[2×8=16]**

a) Explain power law transformation and log transformation with their characteristic curve.

b) Explain Haar transformation.

c) What is meant by histogram of an Image? Explain the significance of histogram equalization

Q3) Attempt any two of the following: **[2×9=18]**

a) Explain the significance of first order and second order derivative for image sharpening.

b) Explain high pass filters in frequency domain.

c) Explain linear and non - linear smoothing filters in spatial domain.

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Q4) Attempt any two of the following: **[2×8=16]**

a) Explain Hit - or - Miss transform in detail.

b) Explain Erosion operation in detail along with mathematical expressions and example.

c) What is use of region filling algorithm? Explain the steps for region filling inside an object in an image with example.

Q5) Attempt any two of the following: **[2×8=16]**

a) Explain region splitting and merging algorithm in detail.

b) What is global and adaptive thresholding, explain in detail

c) How to detect a line or edge in an image explain with an example?

Q6) Attempt any two of the following: **[2×9=18]**

a) What is coding redundancy? Explain with the help of example.

b) What is lossy predictive coding, explain in detail.

c) Draw the block diagram of image compression model and explain in detail.

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VII) (Old)

Examination, November - 2017

EARTHQUAKE ENGINEERING

Sub. Code: 47903

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :

1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data whenever necessary.**
4) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION-I

Q1) a) What are causes of earthquake? Explain in brief plate tectonic theory. **[8]**

b) Classify and describe with suitable sketches, different types of seismic waves generated by an earthquake. **[8]**

Q2) a) Define Logarithmic decrement, how it is measured and derive the equation of Logarithmic decrement. **[7]**

b) The building frame shown in the Fig.1 is given a 100 mm lateral displacement and released from the rest to vibrate freely. Find the logrithmatic decrement and displacement of the system afte 12 cycles and comments on the result. Consider 10% damping. Take $EI_{column} = 1.1 \times 10^{12}$Nmm. **[9]**

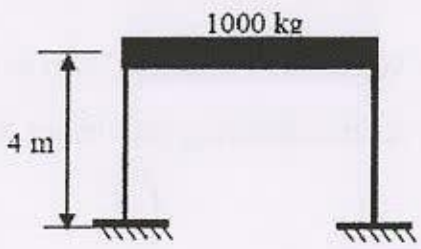


Fig. 1

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Q3) a) Explain in details Force Transmission Ratio. **[05]**

b) A SDOF system consists fo 5 m high column of 600 mm diameter which supports the heavy mass of 10500 kg at its top. The system is subjected to a harmonic force of 1800 sin50t N. Consider 20% damping and E = 2×10^5. Calculate the maximum dynamic amplitude and also state whether the system will have resonance or not? **[11]**

Q4) Calculate the base shear for a five storey hospital building having special moment resisting frame (SMRF) located in Pune on medium soil with following data using seismic coefficient method. **[18]**

a) No. of bay in x and y-direction = 4

b) Width of each bay = 5m

c) Thickness of slab = 150 mm

d) Storey height = 3.2 m

e) Size of beam and column = 300 mm × 450 mm

f) Amount of damping = 5% of critical damping

g) Live load = 4kN/m^2

Assume any additional data if required and neglect the weight of the infill wall panels.

SECTION-II

Q5) a) Explain earthquake design philosophy for building. **[8]**

b) Explain soft storey? Explain how soft storey probelms can be eliminated in the existing buildings. **[8]**

Q6) a) Explain how "ductility of building" can be effectively designed. **[8]**

b) What are the ductile detailing provisions for column? Explain with neat sketches. **[8]**

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Q7) a) What points should be kept in mind while designing earthquake resistant brick masonry structure? **[8]**

b) Discuss in detail the advantage of horizontal bands and vertical reinforcement in the masonry buildings. **[8]**

Q8) Write a short note (Any three): **[18]**

a) Stud Wall Construction.

b) Strong column and weak beam.

c) Effect of soft storey of RC structure.

d) Jacketing of column.

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Total No. of Pages : 2

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

SOLID WASTE MANAGEMENT (Elective-I)

Sub. Code : 67569

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any two of the following: **[2×8=16]**

a) What is Solid Waste and Solid Waste Management? Write the objectives of SWM.

b) State the composition of MSW. Describe the compositions.

c) Write note on Biomedical Waste Management.

Q2) Answer any two of the following: **[2×9=18]**

a) Explain with the help of flow diagram, the functional elements of Municipal Solid Waste Management.

b) Explain the methods of solid waste collection with a neat sketch.

c) Explain in detail with help of figure the different types of Transfer Station.

Q3) Answer any two of the following: **[2×8=16]**

a) List out the different equipment used for processing solid waste and explain any one with neat sketch.

b) What is MRF? Explain the processes for MSW at these facilities with flow diagram.

c) Explain with the figure the different types of air classifiers methods.

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SECTION-II

Q4) Answer any two of the following: **[2×9=18]**

a) What is Sanitary landfilling? Write the site selection criteria for sanitary landfilling.

b) Draw the cross section of sanitary landfill and explain the essential components.

c) Identify the adverse effects of a landfill leachate and its appropriate control measures.

Q5) Answer any two of the following: **[2×8=16]**

a) What is composting? Explain composting process of bio degradable MSW.

b) Explain mechanical composting plant with flow diagram.

c) Explain the different factors affecting composting.

Q6) Answer any two of the following: **[2×8=16]**

a) Explain the working of an incinerator with a neat sketch.

b) Write the air pollution problem associated with incineration system and its control techniques.

c) Describe pyrolysis and its products.

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Total No. of Pages : 2

Seat No.	

B.E. (Civil) (Semester-VII) Examination, November - 2017
GROUND IMPROVEMENT TECHNIQUES (Elective-I)
Sub. Code : 67571

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Que. No. 1 from section-I and Que. No. 5 from section-II are compulsory.**
2) **Solve any two other questions from each of the section.**
3) **Figures to the right indicates full marks.**

SECTION-I

Q1) Answer the following: **[4×5=20]**

a) Explain the various types of vertical drains used in ground improvement.

b) What is mean by dynamic consolidation.

c) Explain use of stone column as ground improvement method.

d) Enlist various ground improvement technique according to their suitability.

Q2) a) How do vertical drains improve the functioning of pre-loading? Explain with neat sketch. **[8]**

b) Explain various components of ground Anchor. **[7]**

Q3) a) Explain design procedure of stone column. **[8]**

b) Explain construction sequence of soil nailing. **[7]**

Q4) Write a short note on **[3×5]**

a) Classification of ground improvement technique

b) Soil nailing

c) Rock Anchor in grannuar soil

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SECTION-II

Q5) Answer the following: **[4×5=20]**

a) Enlist various factor affecting the soil stabilization.

b) Explain the earth reinforcement mechanism.

c) Write down the various application of earth reinforcement.

d) Enlist different types of geosynthetics.

Q6) a) Compare and enlist the various method of soil stabilization. **[8]**

b) Explain the various application of geosynthetics with respect to

i) reinforcement ii) separator

iii) filter iv) drainage **[7]**

Q7) a) Explain the stress-strain relationship of reinforced soil. **[8]**

b) Explain the various types of grout used in ground improvement. **[7]**

Q8) Write a short note on: **[5×3]**

a) Function of geosynthetics

b) Fly-ash soil stabilization

c) Selection of geosynthetics



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Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Part - IV) (Semester - VIII)
Examination, November - 2017
DESIGN OF CONCRETE STRUCTURES - II
Sub. Code : 67748

Day and Date : Wednesday, 1 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary and mention it clearly.**
4) **Use of non programmable calculator is allowed.**
5) **Use of relevant IS Codes are allowed.**

SECTION - I

Q1) Design rectangular beam for limit state of collapse in torsion for following data. **[16]**

Size of beam = 400 × 700mm, over all

Factored Shear force = 95 KN

Factored Bending moment = 180 KN.m

Factored Torsion Moment = 55 KN.m

Effective cover = 50mm

Use M20 and Fe 415

Q2) A RCC beam ABCD spanning over four supports carries a live load of 12KN/m and dead load from walls 300mm, 2.8 high. If M20 grade concrete and Fe 415 grade steel is to be used. Design the continuous beam using IS-456 - 2000 provision. Span AB = BC = CD = 6m Take unit weight brick wall 19KN/m^3. Draw a sketch showing reinforcement details. **[16]**

Q3) Design a square water tank resting on ground having dimensions 4m × 4m and height of water is 3m. Assume free board of 0.2m. Use M20 and Fe 415 grades. **[16]**

P.T.O.

SUK-BCE

Q4) a) Write a note on balanced, under reinforced and over reinforced section as per WSM. **[9]**

b) Explain the concept of moment of redistribution. **[9]**

SECTION - II

Q5) a) Explain in details three concepts of pre-stress concrete section in analysis. **[8]**

b) Explain systems of pre-stressing with figures. **[8]**

Q6) A pre-stressed concrete beam of rectangular section 300mm × 600mm has a span of 10m. The effective pre-stressing force is 980KN at constant eccentricity of 120mm. The dead load of beam is 4.5KN/m and the beam has to carry a live load of 7.5KN/m **[16]**

Determine the extreme stresses,

a) At the end section

b) At the midsection without action of live load

c) At mid section with action of live load.

Q7) A post tensioned pre-stressed concrete beam of 16m span is subjected to an initial pre-stress of 1458KN. The profile of the cable is parabolic with the maximum eccentricity of 520mm at the center of span. **[16]**

$A = 2.42 \times 10^5 mm^2$, $I = 5.30 \times 10^{10} mm^4$, $As = 1386 mm^2$,

$Es = 2.1 \times 10^5 N/mm^2$, $Ec = 3.82 \times 10^4 N/mm^2$

$\mu = 0.25$, $k = 0.0015/m$, anchorage slip = 2.5mm, creep coefficient = 1.5, $\alpha = 0.13$

Determine the following losses in pre-stress,

a) Elastic shortening.

b) Shrinkage in concrete.

c) Creep in concrete.

d) Slip in anchorage.

e) Frictional loss.

Q8) Design a pre-tensioned concrete rectangular section for the following details

Effective span of beam = 12m.

Live load of intensity = 30 KN/m.

Concrete grade = M 35

Ultimate stresses tendon = 1450 N/mm^2

Loss of pre-stress = 20%

Assume Safe stress is 0.6 times Ultimate stress in tendon.

Permissible stress in concrete at transfer stage is 0.5 σ_{CK}

Permissible stress in concrete at working stage is 0.4 σ_{CK}

Permissible tensile stress in concrete at transfer and working stage is 1.2 N/mm^2 **[18]**

★ ★ ★

SUK-BCE

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VIII)
Examination, November - 2017
STRUCTURAL DESIGN OF FOUNDATION AND RETAINING STRUCTURES (Elective - II)
Sub. Code: 67753

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any two questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Use of IS 456- 2000 is allowed.**
4) **Assume suitable data if necessary and mention it clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Two columns A and B 5 m apart between centres carry loads 840 kN and 1200 kN. Design a 2 m wide combined rectangular footing for the columns. The footing shall consist of a central longitudinal beam with cantilevering slabs on either side. Each column is 400 mm × 400mm. The safe bearing capacity of soil is 150 kN/m^2. Use M 20 grade concrete and Fe 415 steel.**[25]**

Q2) A column carrying a load of 2500 kN has to be supported on 4 piles each of size 300 mm × 300 mm. The piles are spaced at 1.00 m centres as shown in figure.1. The column size is 600 mm × 600 mm. Design the pile cap. Use M 20 grade concrete and Fe 415 steel. **[25]**

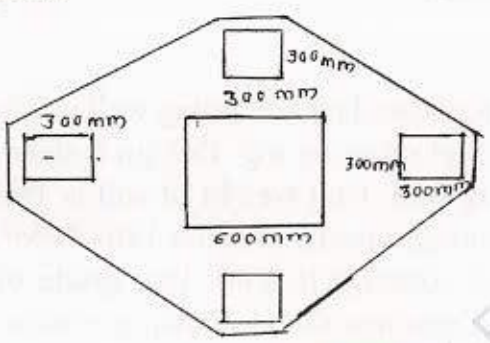


Fig. 1

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P.T.O.

SUK-BCE

Q3) Design a suitable continuous raft foundation connecting the columns of a building 12 m × 12 m shown in figure to suit the following data. **[25]**

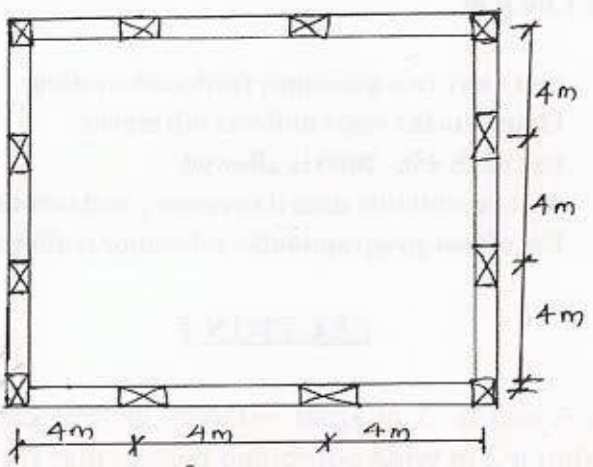
a) Spacing of column = 4 m C/C

b) Service load transmitted = 500 kN on each column.

c) Size of column = 300 mm × 300 mm.

d) Safe bearing capacity = 150 kN/m^2.

e) M 20 concrete and Fe 415 steel.



figure

SECTION-II

Q4) a) Draw neat sketch of well foundation and explain function of each component part in detail. **[12]**

b) Enlist different types of well foundation explain each in detail wiht neat sketch. **[13]**

Q5) A steam of cantilever retaining wall is 3.8m tall, The cantilever retaining wall retains soil up to its top. Design a steam, toe and heel slab of a cantilever retaining wall. Unit weight of soil is 19KN/M^3. The angle of repose is 30°. Safe bearing capacity of soil is 180KN/M^2. The coefficient of friction between soil and concrete is 0.60. Use grade of concrete M_{20} and grade of steel Fe 415. Draw neat sketch showing reinforcement details of cantilever retaining wall. **[25]**

Q6) a) Explain breakwater and its application? Draw a neat sketch and explain vertical wall break water. **[12]**

b) Design armor of rubble mound breakwater if depth of water is 17.0m. Wind velocity is 165Km/Hour. Fetch of wave is 260KM. Allowable bearing pressure on rock is 800KN/M^2. **[13]**

EEE

SUK-BCE

b) Differentiate between free hold property and lease hold property. [5]

c) Write the significance of sinking fund and derive its expression. [5]

Q8) Write short note on (any three): [18]

a) Building lease and occupational lease.

b) Valuer and his duties.

c) Different types of values.

d) Arbitration.

EEE

Total No. of Pages :4

Seat No.	

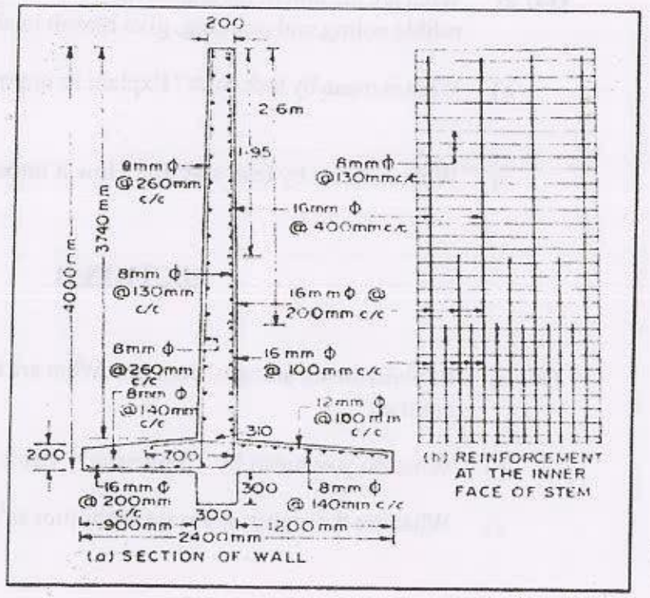
B.E. (Civil) (Semester - VII) (New Course)
Examination, November - 2017
QUANTITY SURVEYING & VALUATION
Sub. Code: 67560

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**
Time :2.30 p.m. to 6.30 p.m.

Instructions :
1) **Q.No. 1 is compulsory.**
2) **Attempt any two questions from remaining questions of section I.**
3) **Attempt any three questions from section II.**
4) **Assume any other additional data if required and state it clearly.**

SECTION-I

Q1) Work out the quantities of below retaining wall 50m in length as stated. **[20]**



P.T.O.

a) Calculate concrete quantity in standard format.

b) Prepare a BBS of given figure in standard format.

Q2) a) Write different types of estimate and state various items to be included in it. **[5]**

b) What is DSR? Prepare analysis of rate for a RCC isolated box footing of area 2.5Ssq.M, and 3.1Sq.M each for a concrete depth 350mm. **[10]**

Q3) a) Which are the various extra charges taken in to account for preparing detailed estimate and why? Explain in detail. **[8]**

b) Write unit of measurement of any three civil engineering items. Write mode of measurement for excavation and concrete. **[7]**

Q4) a) What are the unit of measurement for skirting, door handle, steel sections, rubble soling and pointing, give reason in short. **[5]**

b) What is mean by task work? Explain its importance with suitable example. **[5]**

c) What is mean by lead and lift? How it impacts the cost? **[5]**

SECTION-II

Q5) a) Explain the meaning of contract. What are the reasons of for rejection of contract? **[7]**

b) What do you mean by "Tendering"? Draft a sample tender notice. **[5]**

c) What are the rights and responsibilities of parties of contract. **[5]**

Q6) a) Explain valuation by development method. **[6]**

b) A plot shown in figure is to be valued according to the following details: **[10]**

i) Front width is 50m

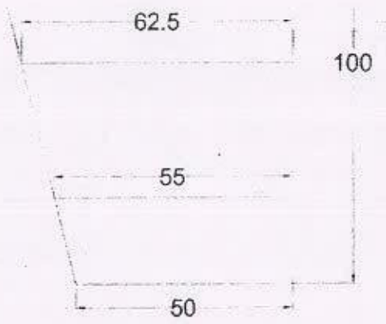
ii) Rear width is 75m

iii) Initial depth is 20m

iv) Market rate of land in the same locality is Rs. 375psm.

Use belting method of valuation.

75



Q7) a) A plate compactor was purchased at Rs. 80,000/-. Assume salvage value to be 10% after 8 years, Calculate depreciation for every year by following methods: **[6]**

i) Straight line method

ii) Constant percentage method.

SF-30

Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

PROJECT MANAGEMENT AND CONSTRUCTION EQUIPMENT

Sub. Code : 67561

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt any THREE questions from each Section.**
2) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain the role of various agencies involved in a construction project. **[8]**

b) A project consists of following activities with their duration in days. **[9]**

Activity	1-2	1-3	1-4	2-5	3-6	4-5	4-6	4-7	5-7	6-7
Duration (days)	6	3	4	0	4	12	10	8	5	6

Draw the network. Find out critical path and project duration.

Following conditions exists at the end of 10^{th} day,

i) Activities 1-2, 1-3, 1-4 have been completed as per schedule.

ii) Activities 4-5, 4-6, 3-6 are in progress and will require 6,6 and 1 more days for its completion, respectively.

iii) Other activities have not been started and their duration holds good except activity 5-7 which will require only 3 days instead of 5 days as planned originally.

Update the network.

SUK-BCE

P.T.O.

)2) a) Explain the concept of Normal and Beta Distribution in P.E.R.T. [8]

b) With the information given in the table draw the network for a construction project. Determine the critical path and its standard deviation. Find Probability of completion of project in 40 days. (For Z = 1.7, Pr. = 95.54%; For Z = 1.8, Pr. = 96.41%) [9]

Activity	Optimistic time	Most likely time	Pessimistic time
1-2	2	5	8
2-3	8	11	20
3-4	0	0	0
2-4	4	7	16
2-5	4	9	20
4-6	7	10	13
5-6	3	7	17
3-7	3	5	13
6-7	2	3	10
7-8	2	4	6

)3) a) Explain various safety equipment used on construction sites. [8]

b) What are the common risks on construction projects? How will you identify these risks? [9]

)4) Write notes on any FOUR. [16]

a) Objectives of Project Management.

b) Milestone Chart.

c) Resource Allocation.

d) Safety Policy.

e) Safety Training.

SECTION-II

)5) a) Explain the construction and operation of Bulldozer with neat sketch. [8]

b) Explain working of Scraper with neat sketch. [8]

)6) a) Explain the construction and working of 'Clamshell'. [8]

b) Enlist various types of compacting equipment. Explain any ONE with sketch. [9]

)7) a) Explain the 'safety measures' in blasting operations. [8]

b) Explain in detail 'Well Point System' of dewatering with neat sketches. [9]

)8) Write notes on any FOUR. [16]

a) Mechanical v/s Manual Construction.

b) Use of Tractors in construction.

c) Tippers.

d) Detonators.

e) Necessity of drainage in excavations.

✡ ✡ ✡

SF-28

Total No. of Pages : 3

Seat No.	

B.E. (Civil Engineering) (Semester - VII)
Examination, November - 2017
EARTHQUAKE ENGINEERING (New)
Sub. Code : 67559

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Assume any suitable data whenever necessary.**
3) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION - I

Q1) a) What is mean by plate boundaries? Explain in details. **[8]**

b) Classify ad describe with suitable sketches, different types of waves generated by an earthquake? **[8]**

Q2) a) Derive the equation of motion and its solution for free damped vibration system. **[8]**

b) Find the natural frequency and natural period for the building frame shown in the fig. 1. During test the frame is given 40 mm initial lateral displacement and released from the rest to vibrate freely. Find the displacement after 4 seconds and number of cycles when amplitude reduced to 1/20 of maximum.Consider 10% damping. Take $EI_{Column} = 1.5 \times 10^{12}$ N.mm^2, $EI_{Beam} = \infty$. **[10]**

OR

b) A SDOF system consists of 5 m high column of 450 mm diameter which supports the heavy mass of 20 tonne at its top. The system is subjected to a harmonic force of 200 Sin 40t kN. Consider 20% damping & $E = 2.1 \times 10^5$ N/mm^2. Calculate the maximum dynamic amplitude. Also, state whether system will have resonance or not? **[10]**

P.T.O.

Q3) Calculate base shear in the critical direction only for BSNL office in Pune with following data by seismic coefficient method. **[16]**

a) No. of storey = 4

b) No. of bay in x direction = 3

c) No. of bay in y direction = 1

d) storey height = 3 m

e) Width of each bay = 5 m

f) Total DL on roof = 12 kN/m^2

g) Total DL on floor = 10 kN/m^2

h) LL = 4 kN/m^2,

i) Thickness of slab = 120 mm

All columns having their longer side in X direction. Neglect weight of infill walls. Assume suitable data if required. Write all your assumptions & clauses of IS 1893 (2002). Building is provided with additional viscous dampers which will increase damping by 10%.

SECTION - II

Q4) a) Explain ductile detailing of beam as per IS 13920: 1993. Also give limitation of this code. **[10]**

b) Explain four virtue of good earthquake resistant design. **[8]**

OR

b) Explain soft storey & discuss its performance of soft storey building in past earthquakes. How will you avoid soft storey? **[8]**

Q5) a) Define the shear wall and its classification? Describe the structural behavior of shear wall? **[8]**

b) Draw the detailed sketch of **[8]**

i) Different ways of beam jacketing as IS code and.

ii) Different ways of columns as per IS code.

Q6) a) Explain in details concept of Friction Pendulum Bearings? **[8]**

b) Explain Tuned Liquid Dampers with its working principal? **[8]**

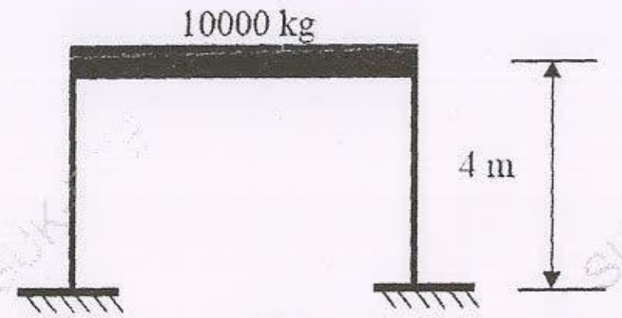


Fig 1.

SF - 23

Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
GEOTECHNICAL ENGINEERING - II
Sub. Code: 66874

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Solve any three from following. **[18]**

a) Explain bore hole logging with sketch for soil and rock exploration.

b) List engineering properties of rock. Explain any one with method for determination.

c) Explain elastic settlement of shallow foundation.

d) List types of bearing capacity failure of soil. Explain any one with sketch.

Q2) Solve any two from following. **[16]**

a) Explain standard penetration test for determination of bearing capacity.

b) A plate load test was carried out on a ground having uniform sand strata up to sufficient depth. The size of the plate used was 30cm×30cm. Determine the bearing capacity and load that can be taken by a column foundation of size 1.2 m× 1.2 m in the above strata for an allowable settlement of 2 cm.

Load(kN)	4.5	9	18	27	36	45	54
Settlement (mm)	0.75	1.25	2.0	3.5	5.38	7.75	10.75

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P.T.O.

c) Write and explain equation of net ultimate bearing capacity of soil for general shear failure by IS code method with shape, depth, inclination of load and water table factor.

)3) Solve any two from following. **[16]**

a) Explain stepwise procedure for design of strap foundation with required equations and sketch.

b) Design a trapezoidal combined foundation for following data:

Column	Size	Load	Remark
A	0.50×0.50 m	2000kN	Column A is on boundary of plot.C/c distance between columns is 5.0 m.Safe bearing capacity of soil is 200kN/m²
B	0.30×0.30m	1500kN	

c) A rectangular foundation of 6.0 mt × 4.0 mt size carries a uniform load intensity 160kN/sq.m and is located at a depth of 1.5 m in a layer of clay having $E=4\times10^4$kN/sq.m and Poisson's ratio as 0.38. This clay layer underlain by second layer of silty soil having $E=7\times10^4$kN/sq.m and Poisson's ratio as 0.48. A hard strata lies below the second layer. Determine the elastic immediate settlement of the foundation.

SECTION-II

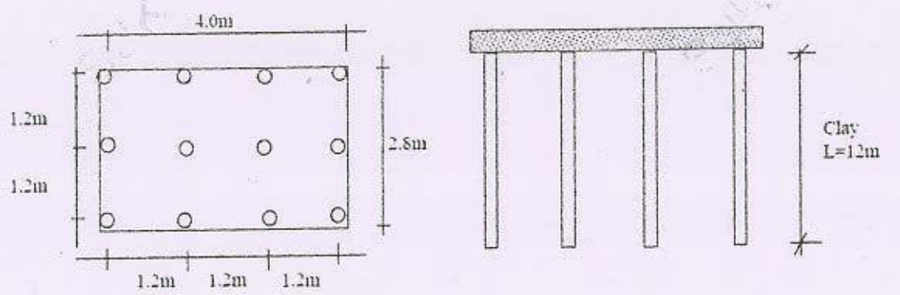
)4) Solve any three from following: **[18]**

a) What is group efficiency of pile group? Explain Feld's rule.

b) Explain with neat sketch under reamed pile and their uses.

c) A rectangular pile of section 0.60 m ×0.75 m and length 12 m penetrates a deposit of clay with c=42 kN/m². Assuming m=0.75, determine the magnitude of negative skin friction.

d) Find the allowable bearing capacity of a single pile in the group of piles given below, by using: Converse-Labarre Formula. Given data:- Diameter: 400mm,Cu=50kPa, $\gamma=18$kN/m³ F.S.=2.5



)5) Solve any two from following: **[16]**

a) Describe the methods of rectifying the tilt in the well during sinking operation.

b) Explain with fig. sand island method.

c) Write the different types and material used for sheet pile.

)6) Solve any two from following: **[16]**

a) Explain the friction circle method of slope stability analysis.

b) Name the techniques used in ground improvement and explain any one.

c) A slope 1 in 2 with a height of 8 m has the following properties of soil are Cu = 28 kN/m², angle of internal friction = 10° and unit weight of soil is 18 kN/m³, Stability Number = 0.064. Calculate factor of safety with respect to cohesion. What will be critical height of the slope in this soil?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
THEORY OF STRUCTURES
Sub. Code: 66873

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**
4) **Assume suitable data if necessary.**

SECTION-I

Q1) a) Explain in brief 'Static Indeterminacy of Structures'. **[5]**

b) Analyze the propped cantilever beam AB of 5m span, fixed at A and propped at B when subjected to a point load of 5kN at 3m from left end A. Take fixed end moment 'M_A' as a redundant. Also draw SFD and BMD. **[12]**

OR

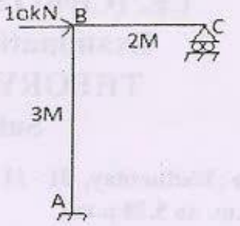
A fixed beam AB 5m in span is subjected to a point load 5kN at 3m from left end A. Analyze the beam by taking 'R_B' and 'M_B' as redundants. Draw SFD and BMD.

Q2) a) Explain 'Unit load Method' to find slope and deflections in structural members. **[5]**

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P.T.O.

b) The bent ABC is subjected to lateral load of 10kN as shown in the fig.1 below. Determine the reactions at support C by strain energy method. Draw SFD and BMD **[12]**



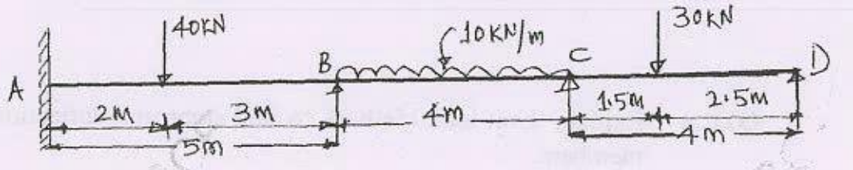
(FIG.1)

)3) A continuous beam ABCD is fixed at A and simply supported at B and C with CD as a overhang wherein AB=4m BC=3m and CD=2m. The span AB is subjected to a udl of 10kN/m throughout, span BC to a point load of 25kN at its midpoint and point D is acted upon by a clockwise couple of 50kNm. During loading support C settles by 5mm. Draw SFD and BMD. Take $EI_{BC} = 2\times10\text{^}4kN/m\text{^}2$. $EI_{AB} = 2EI_{BC}$. **[16]**

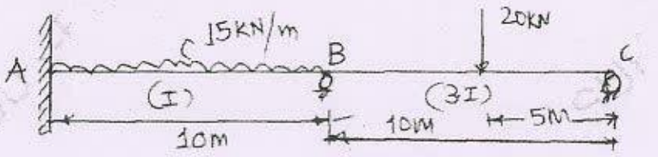
SECTION-II

)4) A two span continuous beam ABC has span AB of 6 m and Span BC of 4 m. End A is fixed while end C of the beam is simply supported. Span AB carries through u.d.l of 20 KN/m and BC carries central point load 40kN.Span AB has its inertia double that of span BC. Analyse the beam using slope deflection method. Draw SFD and BMD. **[17]**

)5) Analysis the continuous beam loaded as shown in fig.by method of moment Distribution method. Sketch the BMD and SFD. **[17]**

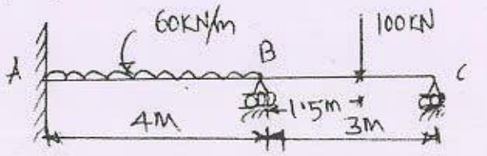


)6) Analysis the two span continuous beam as shown in fig. by stiffness matrix method. Also draw BMD. **[16]**



OR

Analysis the continuous beam as shown in fig.by flexibility matrix method. Take EI constant throughout. **[16]**



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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

GEOTECHNICAL ENGINEERING - I

Sub. Code: 66238

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instruction :

1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any three of the following. **[18]**

a) Derive the relation for bulk unit weight of soil in terms of Sp. Gravity, water content, void ratio of soil and unit weight of water.

b) List and explain corrections applied to hydrometer reading in wet mechanical analysis.

c) Explain soil structures according to structural composition of sedimented soil.

d) A soil has a dry density of 1.72 gm/cc in the natural condition. When the 840 gm of the dry soil was poured in a container in a loose state its volume was 602 cc. The same soil when vibrated and compacted was found to have volume of 440 cc. Determine relative density of the soil.

Q2) Answer any two of the following. **[16]**

a) Explain Darcy's law and its validity used for permeability of soil.

b) Explain flow net. Derive Laplace equation in two dimensional flow used for flow net construction.

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P.T.O.

c) The results of constant head permeability test on soil are follows:-

Internal diameter of permeameter - 7.5 cm.

Head lost over a soil sample length of 18 cm- 24.7 cm

Quantity of water collected in 60 seconds - 626 cc

Porosity of the soil sample - 44%

Determine the coefficient of permeability of soil and also discharge velocity and seepage velocity during the test.

Q3) Answer any two of the following. **[16]**

a) List laboratory methods for determination of compaction factors. Explain any one.

b) Explain fixed ring type consolidometer test for determination of compressibility characteristics of soil with neat sketch.

c) The following are the results of the standard Proctor compaction test.

Mass of mould and compacted soil (gm)	2925	3095	3150	3125	3070
Water content (%)	10.0	12.0	14.3	16.1	18.2

Volume of mould - 1000 cc, Mass of mould - 1000 gm,

Sp. Gravity of soil solids - 2.70

Plot the compaction curve showing OMC and MDD. Determine the degree of saturation at MDD.

SECTION-II

Q4) Answer any three of the following. **[18]**

a) With a neat sketch explain pressure bulb and its significance.

b) Write a note on Newmark's chart.

c) Prove that maximum vertical stress on a plane at a distance 'r' from concerned load Q acting at ground surface will be at a depth $z = 1.225r$.

d) A water tank is supported by a ring foundation having outer diameter of 8 m and inner diameter of 6m. The uniform load intensity on the foundation is 300kN/m^2. Compute the vertical stress caused by the water tank at a depth of 4 m below the center of the foundation.

Q5) Answer any two of the following. **[16]**

a) Explain unconfined compression test procedure with neat sketches.

b) An unconfined cylindrical specimen of clay fails under an axial stress of 240 kN/m^2. The failure plane was inclined at an angle of 55° to the horizontal. Determine the shear strength parameters of the soil.

c) The results of two drained triaxial tests on a saturated clay follows:-

Specimen I :- σ_3=70 kN/m^2 and σ_d=130 kN/m^2

Specimen II :- σ_3= 160 kN/m^2 and σ_d= 223.5 kN/m^2

Determine the shear strength parameters. Solved by analytical method.

Q6) Answer any two of the following. **[16]**

a) Derive an expression for Rankine's active earth pressure due to submerged cohensionless backfill with neat sketch.

b) A cantilever retaining wall of 7 m high retains sand. The properties of the sand are e = 0.5, ϕ=30°, and G = 2.7. Using Rankine's theory determine the active earth pressure at the base when the backfill is

i) dry

ii) saturated and

iii) submerged.

c) A retaining wall 6 m high retains a clay backfill with c= 20 kN/m^2, ϕ=15° and γ= 18 kN/m^3. Assume that the wall is smooth and the back vertical. It is expected that tension cracks may develop to the full theoretical depth. Calculate the total active earth force a acting on the wall.

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Total No. of Pages : 3

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T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

ENVIRONMENTAL ENGINEERING - I

Sub. Code :66237

Day and Date : Tuesday, 14- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Assume and mention data if necessary.**

Q1) Answer Any Three of following. **[3 × 6 = 18]**

a) Explain the basis on which the water source is selected for water supply.

b) 'Water should be necessarily treated before municipal supply.' Explain.

c) State details of intake well from its place and importance point of view.

d) Explain design steps for intake well.

e) Write a note on Population Forecasting.

Q2) a) Design a cascade aerator for 10 MLD flow. **[8]**

b) Explain the concept of destabilization of colloidal particles during coagulation. **[4]**

c) Explain the concept of tube & plate settler. **[4]**

Q3) a) What is demineralization? Explain any one process in detail. **[6]**

b) Explain detailed operation of filtration process in rapid sand filter with diagram. **[6]**

OR

b) Explain water softening process. Explain any one in detail. **[6]**

c) Explain forms of chlorination. **[4]**

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SECTION - II

Q4) Answer any three of following. **[3 × 6 = 18]**

a) Explain details of steel pipes with respect to strength, durability, leakage, laying, transportation, availability and advantages.

b) Mention necessity and types of reservoirs in detail.

c) Write a note on

i) Pumping mains

ii) Gravity mains

d) Explain the pressure testing process in detail.

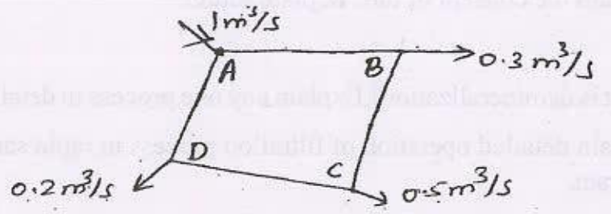
e) Explain factors considered for choice of pipe materials.

Q5) a) What are the various layout patterns of water distribution system? **[5]**

b) A pipe network consist of following pipes- **[8]**

Pipe	Length(m)	Dia(mm)	Friction factor
AB	400	300	0.014
BC	600	300	0.010
AD	500	400	0.012
DC	500	250	0.011

Inflow at A is 1 m3/s, while outflow at B,C and D are 0.3, 0.5 and 0.2 m3/s respectively. Find flow in pipes.



c) "Software plays a vital role in network analysis." Explain. **[3]**

Q6) a) Explain fire hydrants and water meter in detail. **[6]**

b) Explain the maintenance of water distribution system. **[6]**

OR

b) Write a note on green building materials. **[6]**

c) What is water budgeting? **[4]**

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester - V) Examination, November - 2017

DESIGN OF STEEL STRUCTURES (New)

Sub. Code : 66236

Day and Date : Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions Compulsory.**
2) **Use of IS 800:2007, IS 875, Steel table, Non programmable calculator permitted.**
3) **Figure to the right indicate full marks.**
4) **Draw sketches wherever necessary.**
5) **Assume suitable data if required.**

SECTION - I

Q1) a) What is serviceability Limit state? Explain. **[4]**

b) Write note on "High Strength Friction Grip (HSFG) bolts." **[4]**

c) A tension member is subjected to force of 150 KN. The member consists of a plate 75mm × 8mm in size is connected to 10mm thick gusset plate. The grade of steel is Fe 410. Design fillet weld if (a) Weld is provided on two sides of plate in direction of force. (b) Weld is provided on three sides of plate. **[8]**

Q2) a) Explain in brief with sketches the modes of failure of tension members. **[6]**

b) A tension member of a truss consist of two angles 75×50×6 which are provided on either side of a 10mm thick gusset plate. 20mm dia. Bolts are used in one row for connecting the member to the gusset plate. Determine design tensile strength of the member and also the number of bolts required to develop the design tensile strength. **[12]**

OR

b) Design an angle section to carry a factored tensile force of 200 kN. Bolts of 20mm diameter are to be provided for the connection of the member to the gusset plate. Take fy = 250Mpa and fu = 410 Mpa. **[12]**

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23) a) Explain the terms with reference to compression members, (i) Effective length of struts, (ii) Slenderness ratio. **[4]**

b) Two angles 90×60×8 are used as strut 3m long and connected to 10mm thick gusset plate at each end. Determine the design strength of the strut for the following cases. **[12]**

i) When the longer leg of the angle are connected on either side of gusset plate.

ii) When the longer leg of the angle are connected to same side of gusset plate

SECTION - II

24) a) Why lacing is provided for column? How much load is taken by lacing. **[4]**

b) Design a 8m long built up column to carry a factored axial load of 1250 KN . The column is restrained in position but not direction at each end. The column shall consist of two channels placed toe to toe at a suitable spacing. **[12]**

OR

b) An ISHB400 @759.3 N/m column carries a factored axial load of 2000 KN. Design a slab base for the column. Assume that the bearing surfaces of the column and base plate are machined. The concrete footing is of M20 grade. **[12]**

25) a) What is web buckling and web crippling? How the beam checked against web bucking and crippling? **[6]**

b) A 150mm thick slab is supported on steel beams of effective span 5.25m which are spaced at 3.25m c/c. Allow live load of 3.50 kN/m^2 and a 40mm floor finish at 20 kN/m^3.Design the beam and check it for shear. **[12]**

26) a) Draw neat sketch of (i) crane gantry girder assembly (ii) the typical cross sections for gantry girder. **[4]**

b) The Crane system has the following data. Determine the design forces acting on it. **[12]**

- Crane capacity = 100kN
- Weight of crane girder = 90kN
- Weight of crab,motor,hook = 20kN
- Minimum hook Approach = 1.1 m
- Wheel base = 2.5 m
- Span of gantry girder = 5.5 m
- Weight of gantry girder = 8 kN
- c/c spacing of crane rails = 20 m

The crane is electrically operated.

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Total No. of Pages : 3

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T.E. (Civil) (Semester-V) (Revised) Examination, November - 2017

WATER RESOURCES ENGINEERING - I

Sub. Code : 66235

Day and Date : Thursday, 09-11-2017 **Total Marks : 100**

Time : 10.0 a.m. to 1.00 p.m.

Instructions :
1) **Que. 1 and 5 are Compulsory. Attempt any two questions from remaining questions from both sections.**
2) **Assume any suitable data if necessary, wherever needed.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain infiltration capacity of the soil with help of a graph. Explain the effects of infiltration. **[6]**

b) Describe the procedure to construct unit hydrograph from storm hydrograph. **[6]**

c) Explain how discharge of the water stream is measured? Explain any one method in detail. **[6]**

Q2) a) Exnlist different methods of assessment of average precipitation. Explain any one method in detail with a neat sketch. **[8]**

b) Define evaporation process. Describe the factors affecting evaporation and also the measures to reduce it. **[8]**

Q3) a) Define unit hydrograph. List the assumptions and limitations involved in unit hydrograph theory. **[8]**

b) Given below are the ordinates of 4 hour unit hydrograph. Derive and plot 16 hour unit hydrograph. Describe the procedure in detail. **[8]**

Time(hours)	0	4	8	12	16	20	24	28	32	36	40
Observed flow(m^3)	0	16	58	89	145	80	55	36	16	8	0

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Q4) Write detailed notes on: **[16]**

a) Abstract losses from precipitation

b) Factors affecting runoff

c) Site selection criteria for discharge measurement of river.

d) Flood frequency analysis

SECTION-II

Q5) a) Define porosity, specific yield and specific retention and obtain relation between them. **[6]**

b) The base period, intensity of irrigation and duty of water for various crops under a canal system are given below. Determine the reservoir capacity if culturable commanded area is 40000 hectors, canal losses are 20% and reservoir losses are 10%. **[6]**

Crop	Base period (Days)	Duty of water at the field (Hectors/ cumec)	Intensity of irrigation (Percentage)
Cotton	180	1400	10
Sugar cane	360	1700	20
Wheat	120	1800	20
Rice	120	800	15
Vegetables	120	700	15

c) Explain Bandhara irrigation scheme in detail. **[6]**

Q6) a) Derive an expression for discharge from a well in unconfined aquifer the well fully penetrates it. **[8]**

b) Briefly explain role of ground water in water resources development of country. **[8]**

Q7) a) Explain in detail following: **[6]**

i) Intensity of irrigation

ii) Kor watering

iii) Kor depth

iv) Kor period

v) Crop ratio

vi) Overlap allowance

b) Explain estimation of evapo-transpiration by penman method. **[5]**

c) Discuss in brief water logging and land drainage. **[5]**

Q8) a) Explain need and importance of water shed management. **[8]**

b) Explain with neat sketch the layout, main components and working of percolation tanks also explain its advantages and disadvantages. **[8]**

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Part - III) (Semester - V) (Revised) Examination, November - 2017

TRANSPORTATION ENGINEERING - I

Sub. Code : 66239

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Explain the classification of roads according to Lucknow Road Plan. **[8]**

b) Explain the factors controlling the highway alignment. **[8]**

OR

b) What do you understand by 'Stopping Sight Distance'? State the factors affecting Stopping Sight Distance. Calculate the SSD on a level road for design speed of 60 kmph for two-way traffic on a single lane road. Assume coefficient of friction 0.36 and reaction time of driver as 2.5 Seconds. **[9]**

Q2) a) What is the significance of 'Penetration Test on Bitumen'? Explain the procedure in detail. **[8]**

b) Explain functions of the components of a flexible pavement with sketch. **[8]**

OR

b) Explain 'CBR Test'. How the pavement thickness is determined by CBR method? **[9]**

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Q3) a) What are the objects of conducting 'Traffic Volume Study'? Explain the methods of Traffic Volume Study. [8]

b) Explain the steps of construction of Cement Concrete Pavements. [8]

OR

b) State the necessity and methods of Highway Drainage. [8]

SECTION - II

Q4) a) Explain movement of aeroplane about three axes with a neat sketch. [8]

b) Explain with sketches, [8]

i) Fillets,

ii) Holding Apron

OR

b) Determine the length of runway required for following data, [9]

Basic runway length under standard conditions = 1200m

Site elevation above M.S.L. = 900 m

Aerodrome reference temperature = 16°C

Effective gradient = 0.5%

Q5) a) Explain with sketches, [8]

i) Wave action on a sea wall

ii) Littoral Drift

b) Explain Dry Docks and Wet Docks. [8]

OR

b) Explain the requirements of a harbour. State the factors to be considered while selecting a harbour. [8]

Q6) a) Explain: [8]

i) Lighting in tunnels;

ii) Ventilation in tunnels

b) Explain 'Shield Method' of tunneling in soft ground with sketch. [8]

OR

b) Explain the operations in sequence in one cycle of tunneling in hard rock. [9]

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Total No. of Pages : 3

Seat No.	

T.E. (Civil Engg.) (Part - II) (Semester - VI) (Revised) Examination, November - 2017
ENGINEERING MANAGEMENT
Sub. Code: 66875

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) a) Enumerate principles of management given by Henry fayol and explain any three of them? **[8]**

OR

a) With suitable example explain decision tree? **[8]**

b) Four salesman are to be assigned to four district Estimates of sales revenue in thousands of rupees for each salesman is given below.

Assign salesman to the district. **[10]**

Salesman	District			
	A	B	C	D
01	32	35	40	28
02	40	25	30	22
03	42	27	34	30
04	25	39	41	35

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Q2) a) Enumerate types of organization? With neat organization structure diagram explain any one along with its advantages and disadvantages? **[8]**

OR

a) Define planning? Explain process and characteristic of planning? **[8]**

b) Calculate total cost of inventory & EOQ from following annual consumption of 36000 units, inventory carrying cost is 20%per annum with ordering cost 25 RS associated with one order & cost per item is 1 Rs? **[8]**

Q3) Write any two **[16]**

a) Derive derivation for EOQ formula.

b) State and describe importance of management in construction industry.

c) Explain ABC analysis concept with neat graph?

SECTION - II

Q4) a) Suggest which equipment should be purchased if rate of interest is 12% per year by using present worth method.

	Equipment A	Equipment B
Initial Cost (Rs)	Rs 25000/-	Rs 35000/-
Annual O & M cost (Rs)	Rs 9000/-	Rs 7000/-
Salvage value (Rs)	Rs 2000/-	Rs 3500/-
Life (in Years)	5	5

[12]

b) With suitable example explain the term equivalence. **[6]**

OR

b) With suitable example explain the term time value of money. **[6]**

Q5) a) Draw a typical layout for site of construction of multistoried building. **[5]**

OR

a) What do you know about child labour act? **[5]**

b) What are the factors considered for site layout? **[5]**

c) Write a detailed note on building and other construction workers act. **[6]**

Q6) Write Any 2 **[16]**

a) Write down procedure for value analysis?

b) Draw quality circle organization structure and explain benefits of quality circle?

c) With neat flow chart describe the procedure of work study?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (New) Examination, November - 2017

ENGINEERING GEOLOGY

Sub. Code: 66876

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Answer to the two sections must be written in one and same answer book.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) Attempt any two of the following:

a) Describe with neat sketches depositional features formed by river. **[9]**

b) What is meant by Igneous Rock? Give the classification of Igneous Rocks on the basis of mode of occurrence. Mention one rock from each group. **[9]**

c) What are the parameters of fault? Explain the causes of faulting. **[9]**

Q2) Attempt any two of the following:

a) Explain in brief various process of weathering. **[8]**

b) What is metamorphism? Describe in detial the agents of metamorphism. **[8]**

c) Describe with the help of neat sketches the part of folds. Give in brief the Civil Engineering significance of fold. **[8]**

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Q3) Write short notes on: [16]

a) Interior of the Earth.

b) Grain size classification of Sedimentary Rocks.

c) Types of unconformity.

d) Scope of Engineering Geology.

SECTION-II

Q4) Attempt any two of the following:

a) Explain the various causes of earthquake. Write a brief note on RIS. [9]

b) Describe the internal causes of landslides. [9]

c) With a suitable sketch explain the zones of groundwater. [9]

Q5) Attempt any two of the following:

a) Explain the various steps in the preliminary geological investigation at a civil engineering site. [8]

b) Data obtained from a drill hole at foundation site is as follows. [8]

i) Top of borehole- R.L.410 m.

ii) Bottom of borehole- R.L. 380 m.

iii) Length of each piece of core obtained between 400m and 397m is, 16, 11, 13, 09, 08, 21, 23, 06, 05, 09, 08, 14, 19, 23, 21, 16, 18, 07, 06, 07, 10

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Find,

1) Total length of core recovered

2) Core Recovery

3) Core loss

4) RQD

c) Explain the suitable and unsuitable conditions for excavating a tunnel. **[8]**

Q6) Write short notes on the following: **[16]**

a) Dams on Deccan Trap.

b) Overbreak.

c) Observations during drilling.

d) Confined aquifer.

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Total No. of Pages : 3

Seat No.

S.E. (Civil) (Part - II) (Semester-IV) Examination, November - 2017
FLUID MECHANICS - II
Sub. Code : 63347

Day and Date : Monday, 06-11-2017 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) Question no. 1 and 5 are compulsory.
2) Attempt any other two questions from each section.
3) Assume any suitable data if necessary.
4) Figures to the right indicate full marks.

SECTION-I

Q1) a) Design an efficient trapezoidal channel of side slope2H:1V bed slope 1 in 4900 to carry a discharge of $8m^3/sec$. Take Manning's n=0.025. [5]

b) Define - Most economical channel section. Derive the formula for most efficient triangular section. [5]

c) Derive an expression for the loss of energy due to hydraulic jump in a rectangular channel is in the form of [5]

$$\Delta E = \frac{(Y_2 - Y_1)^3}{4 Y_1 Y_2}$$

d) Compare Gradually Varied flow and Rapidly Varied Flow? [5]

Q2) a) Draw the following [5]
i) Specific energy curve.
ii) Specific force curve.
iii) Discharge diagram.

b) A 3m wide rectangular channel carries a discharge of $1.85m^3/sec$ at a depth of 0.5m. Find the greatest allowable contraction in the width to get critical flow at the contracted section. [5]

c) Derive Chezy's formula for uniform flow in an open channel. [5]

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Q3) a) Derive the expression

$$(dy/dx)=\frac{So-Sf}{1-Fr^2}$$

Where (dy/dx) =Water surface slope

So = channel bottom slope

Sf = Energy line

Fr = Froude Number **[5]**

b) Discuss the relation between water surface slope and channel bottom slope. **[5]**

c) Write a note on M_1 and M_3 curve. **[5]**

Q4) a) Derive the expression for hydraulic jump

$$\frac{Y_2}{Y_1}=\frac{1}{2}\left\{-1+\left(1+8\left(Y_c/Y_1\right)^3\right)^{1/2}\right\}$$

Where Y_1 = depth of water before jump

Y_2 = depth of water after jump

Y_c = critical depth. **[5]**

b) A rectangular channel 7.5m wide has a uniform depth of flow of 2.0m and has a bed slope of 1 in 3000. If due to weir constructed at the down stream end of the channel, water surface at a section is raised by 0.75m. Determine the water surface slope with respect to horizontal at this section. Assume Manning's n = 0.02. **[5]**

c) A rectangular channel carries a discharge of $2m^3$/sec per meter width. If the loss of energy in the hydraulic jump is found to be 2.75m, determine the conjugate depths before and after the jump. **[5]**

SECTION-II

Q5) a) Discuss the advantages of Triangular weir over Rectangular weir. **[5]**

b) Write a note on ventilation of weir. **[5]**

c) What are advantages of hydro-electric power plant. **[5]**

d) What are the different efficiencies of a centrifugal pump. **[5]**

Q6) a) Derive an expression for the force exerted by the jet at centre on a stationary curved plate. **[5]**

b) A 50mm diameter jet having a velocity of 25m/sec strikes a flat plate the normal of which is inclined at 30° to the axis of the jet. Calculate the normal force exerted on the plate. **[5]**

i) When the plate is stationary.

ii) When the plate is moving with a velocity of 10m/sec in the direction of the jet.

c) In an experiment on a 90°V notch, the flow is collected in a rectangular tank having the cross section 0.8×0.8m.If the water level in the collecting tank changed from 0.7m to 1.4m in 17.2 seconds when the head over the notch was 0.2m, estimate the coefficient of discharge for the notch. **[5]**

Q7) a) Write short note on NPSH- centrifugal pump. **[5]**

b) Define Static head, Manometric head, Delivery head, Gross head and suction head. **[5]**

c) Write short note on common pump troubles. **[5]**

Q8) a) What is hydraulic turbine? How are they classified? **[5]**

b) What are disadvantages of hydroelectric power generation? **[5]**

c) Draw the figure of Francis turbine. **[5]**

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Total No. of Pages : 3

Seat No.	

S.E. (Civil Engineering) (Semester-IV) (New) Examination, November - 2017
CONCRETE TECHNOLOGY
Sub. Code :63346

Day and Date : Friday, 03- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) a) Describe effect of impurities in water on properties of concrete. **[8]**

b) Describe the procedure for determining standard consistency of cement. **[8]**

Q2) a) Define placing of concrete and describe the different method of placing of concrete. **[8]**

b) Compare slump test and compacting factor test for determining the workability of concrete. **[8]**

OR

b) What do you mean by mineral admixture? Explain in detail silica fume and GGBS? **[8]**

Q3) a) Enlist different tests for hardened concrete. Explain Split cylinder test. **[9]**

b) What is creep and shrinkage of concrete? List the factors affecting creep and shrinkage of concrete. **[9]**

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SECTION - II

Q4) Write short notes (any three) **[18]**

a) Ferrocement

b) No-fines concrete

c) Vacuum Dewatered Concrete

d) Roller Compacted Concrete

Q5) a) What is durability of concrete? Enlist factors affecting durability of concrete. Explain any one in detail. **[8]**

b) What is permeability of concrete? Enlist factors affecting permeability of concrete. Explain any one in detail. **[8]**

OR

b) List various Non-Destructive tests for assessment of strength of concrete. Explain Rebound Hammer test. **[8]**

Q6) Define the "Mix design" and design concrete mix M20 using following data and IS: 10262 procedures. **[16]**

a) Max. size of aggregate - 20 mm

b) Degree of workability = 0.80 CF

c) Degree of quality control = good

d) Type of exposure = mild

e) w/c = 0.47

f) Cement used = OPC 53 grade

g) Sp. Gravity of cement = 3.15, Coarse aggregate = 2.85, Fine aggregate = 2.65

h) Water absorption of Coarse aggregate = 0.5%, Fine aggregate = 1.0%

i) Free moisture in C.A. =0.0%, F.A. = 0.0%

j) Bulk density of Cement = 1440, C.A. = 1650, F.A. = 1800 kg/m^3

Take standard deviation: 5 and Tolerance factor: 1.65

Table No. 2 Maximum Water Content per Cubic Meter of Concrete for Nominal Maximum Size of Aggregate

Sr.No.	Nominal Maximum Size of Aggregate	Maximum Water Content kg/m^3
1	10	208
2	20	189
3	40	165

Table No. 3 volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate

Sr.No.	Nominal Size of Aggregate	Zone IV	Zone III	Zone II	Zone I
1	10	0.50	0.48	0.46	0.44
2	20	0.66	0.64	0.62	0.60
3	40	0.75	0.73	0.71	0.69

Sl. No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Contents kg/m^3	Maximum Free W/C ratio	Minimum Grade of concrete	Minimum Cement Content kg/m^3	Maximum Free W/C ratio	Minimum Grade of Concrete
1.	Mild	220	0.60	-	300	0.55	M 20
2.	Moderate	240	0.60	M 15	300	0.50	M 25
3.	Severe	250	0.50	M 20	320	0.45	M 30
4.	Very Severe	260	0.45	M 20	340	0.45	M 35
5.	Extreme	280	0.40	M 25	360	0.40	M 40

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SF - 15

Total No. of Pages :3

Seat No.	

S.E. (Civil) (Semester - IV) (Revised) Examination, November - 2017
SURVEYING - II
Sub. Code: 63345

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Answer any THREE questions from Each section.**
2) **Figures to the RIGHT indicate FULL marks**
3) **Assume suitable data if NECESSARY and state them clearly.**
4) **Answers shall be supported by adequate sketches.**

SECTION-I

Q1) Attempt any three questions.

a) Explain the theory of Stadia tacheometry in detail. **[7]**

b) To find the RL of station C two observations are taken by a theodolite from station A. One to a BM and the other to the station C. The record as follows.

Inst. station	Staff station	Target	Vertical angle	Staff Reading	Remark
A	BM	Lower Upper	–12°30' –8°20'	0.565 2.565	RL of BM=755.5m
A	C	Lower Upper	–7°30' +3°12'	1.25 3.2	

Find RL of C and the distance between the BM and station C. BM and stations A,C are collinear. **[10]**

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Q2) a) What are the factor consider for selection of base line? [4]

b) Explain the principle of EDM. [4]

c) Two triangulation stations A and B 60 km apart and have elevations 240 m and 280m respectively. Find minimum height of signal required at B so that line of sight may not pass near the ground than 2 meters. The intervening ground may be assumed to have uniform elevation of 200m. [9]

Q3) Write a short note any four. [16]

a) Tacheometric contouring

b) Total station

c) Trilateration

d) Reconnaissance in triangulation

e) Triangulation figures.

Q4) a) What is spherical triangle? Discuss its properties. [5]

b) Define the following terms.

i) Rational horizon

ii) Prime vertical

iii) Visible horizon [6]

c) Explain the significance of Polaris in field astronomy. [5]

SECTION-II

Q5) a) Derive an expression for calculating ordinates from long chord. [5]

b) Find out the necessary data for setting out a simple circular horizontal curve by the method of offsets from chords produced. Take peg interval as 20m., angle of intersection as 144°, radius of curve as 300m., chainage at point of intersection as 1390 m. [9]

c) What are the functions of a Transition curve. [3]

Q6) a) Draw a neat line diagram of mirror stereoscope and also explain the principle on which it works. [6]

b) Calculate the maximum number of photographs required to cover a fairly level area with the following data. Scale of photography is 1:10,000, Area is 100Sq.Km, Longitudinal overlap is 60% , Side lap is 30%, Size of photographs is 20 cm. × 20 cm. [6]

c) Discuss the uses of Photogrammetry. [5]

Q7) a) Explain Electromagnetic energy and its interaction with matter. [8]

b) Describe in brief the segments of GPS. [5]

c) What are the advantages of GIS. [3]

Q8) Write short notes on. [16]

a) Vertical curves

b) Reverse curves

c) Fiducial marks and fiducial axes

d) Atmospheric windows.

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Total No. of Pages : 3

Seat No.	

S.E. (Civil) (Semester - IV) (Revised) Examination, November - 2017

STRUCTURAL MECHANICS

Sub. Code : 63344

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of electronic calculator is permitted.**
4) **Assume suitable data if necessary and mention it clearly.**

SECTION - I

Q1) a) Derive the for normal and tangential stresses on a plane making angle θ with σ_x direction. **[6]**

b) A thin cylinder with 1000 mm dia. and 20 mm wall thickness is subjected to internal pressure of 2 MPa. In addition the cylinder is subjected to shear stress of 30 MPa. Calculate the principal stresses and their orientation. **[10]**

Q2) a) Derive the limiting value of eccentricity on rectangular section for no tension condition and show the kern of the section. **[6]**

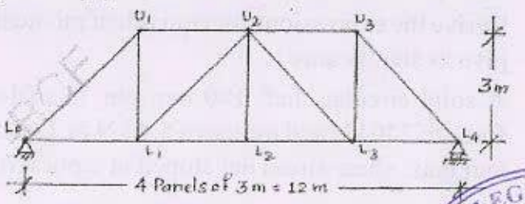
OR

Discuss different modes of failure of gravity dam and their significance in analysis of dam.

b) A trapezoidal masonry dam 4 m high is 1 m wide at top and 3 m wide at base retains water against vertical face. Determine max. and min. intensities of pressure. Unit weight of masonry = 20 kN/cum. **[10]**

Q3) Attempt any two : **[2 × 9 = 18]**

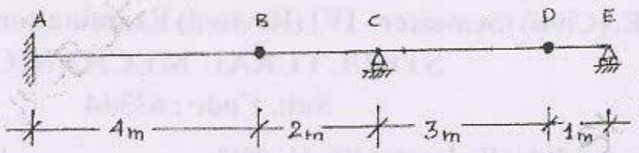
a) Construct the influence line diagrams for force in members U_1U_2, L_1L_2, L_2U_3 and U_1L_1 of the through truss shown in fig. 1



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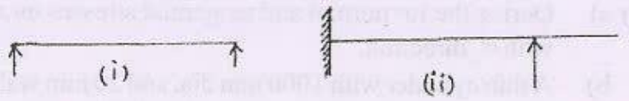
b) Construct the influence line diagrams for reaction at A and moment at A of the compound beam shown in fig. 2.



c) Using the I.L.D.s of Q.3 (b) find the values R_A and M_A when load of 100 kN acts at D.

SECTION - II

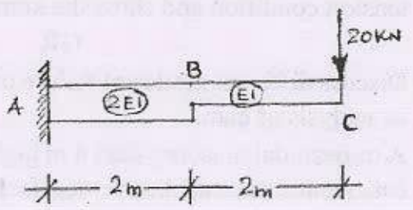
Q4) a) State the conjugate beam theorems with neat diagrams and draw the conjugate beams for the beams shown in the fig.3. **[6]**



OR

Using double integration method find the central deflection of the simply supported beam subjected to u.d.l. on entire span.

b) Find the slope and deflection at end C of the beam shown in fig. 4. **[10]**



Q5) Attempt any two : **[2 × 9 = 18]**

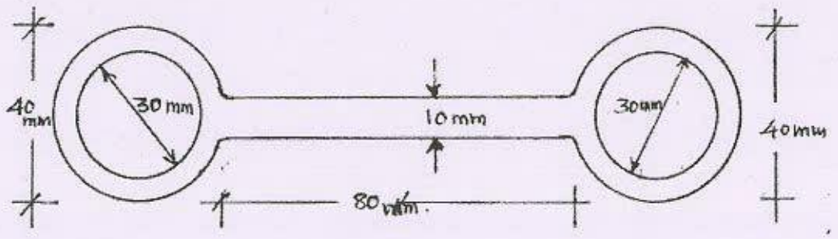
a) The maximum allowable shear stress in a hollow shaft whose outer dia. is twice the inner dia. is 80 MPa. Determine the diameter of the shaft if it is subjected to torque of 4 kN.m. and bending moment of 3kN.m.

b) Derive the expressions for equivalent moment and equivalent torque and give its significance.

c) A solid circular shaft 100 mm dia. is subjected to axial compressive force of 240 kN and torque of 5.4 kN.m. Determine the principal stresses and max. shear stress developed at a point on the surface of the shaft.

Q6) a) State the assumptions and limitations of the Euler's formula. **[5]**

b) The member of a frame of machine acts as strut with both ends fixed. The cross section of the member is formed of two tubes and a plate welded as shown in fig.5. The length of the member is 1.5 m. Taking factor of safety = 6 find the maximum load the member can resist. Take $f_y = 320$ N/mm², $\alpha = 1/7500$. **[11]**



Q8) Write short notes on any three of following: [18]

a) Concept of HGL and TEL with illustrative sketches.

b) Use of Moody's chart.

c) Boundary layer: concept, separation and control.

d) Water hammer and surge tank.

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Total No. of Pages :4

Seat No.

S.E. (Civil) (Semester - III) Examination, November - 2017
FLUID MECHANICS - I
Sub. Code: 63341

Day and Date :Tuesday, 21 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions : 1) Attempt any three questions from each section.
2) Figures to the right indicate full marks.

SECTION - I

Q1) a) Define and explain significance of following fluid properties with their SI units. [8]

i) Viscosity.

ii) Bulk modulus of elasticity.

iii) Vapor pressure.

iv) Surface tension and Capillarity.

Give practical examples.

b) Find the form of equation for discharge Q through a sharped edged triangular notch, which depends on central angle α of notch, head H , acceleration due to gravity g , density ρ, viscosity μ and surface tension σ. Use Buckingham π theorem of dimensional analysis. [8]

Q2) a) Explain how to calculate total pressure acting on a curved surface immersed in liquid. [4]

b) Find total pressure acting on unit length of a dam with vertical upstream face for a depth of water 50 m out of which bottom 10m is silt of specific gravity 1.2. Draw a sketch to show pressure diagram. [6]

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c) A wooden cylinder of circular section and uniform density, specific gravity 0.6 is required to float in oil of specific gravity 0.8. If the diameter of the circular is d and its length is '1' can not exceed about 0.817d for cylinder to float with its longitudinal axis vertical. **[6]**

Q3) a) What is flownet? What are methods of drawing flownet? Give the uses of flownet and its limitations. **[6]**

b) Define stream function and velocity potential function.

The velocity components in a 2 dimensional flow field for an incompressible fluid are expressed as **[6]**

$$u = y^3/3 + 2x - x^2y$$

$$v = xy^2 - 2y - x^3/3$$

Obtain an expression for stream function ψ

c) Two velocity components are given in the following case, find the third component such that they satisfy the continuity equation. **[4]**

$$u = x^3 + y^2 + 2y^2$$

$$v = -x^2y - yz - xy$$

Q4) Write short note on any three of following : **[18]**

a) Dimensionless numbers and their significance in model studies.

b) Stability of submerged and floating bodies.

c) Types of flow in pipe with practical examples.

d) Pressure measurement devices.

SECTION - II

Q5) a) Derive Euler's equation of motion along a stream line and further derive Bernoulli's theorem. What are the limitations. **[8]**

b) A venturimeter is to be fitted in a pipe of 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is 8.1 m^3/min. Find the least diameter of throat to ensure that the pressure head does not become negative. Take Cd = 0.96 **[4]**

c) Derive the expression for time required to empty the tank through an orifice. **[4]**

Q6) a) Explain Reynold's experiment. **[6]**

b) Oil of viscosity 0.1 Pa.s and specific gravity 0.90, flows through a horizontal pipe of 25 mm diameter. If the pressure drop per meter length of the is 12 KPa. Determine,

i) The rate of flow in N/min.

ii) The shear stress at the pipe wall.

iii) The Reynold's number of the flow

iv) The power required per 50 m length of pipe to maintain the flow. **[6]**

c) What do you mean by hydraulically smooth and rough boundaries. **[4]**

Q7) a) What are the different losses in pipe flow? Derive expression for each loss. **[8]**

b) A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2 m length of pipe was replaced by 75 mm diameter pipe, the change of section being sudden? Take f = 0.04 for the pipes of both diameter. **[8]**

SF - 1010

Seat No.	

Total No. of Pages : 3

SE (Civil) (Part - II) (Semester - III) Examination, November - 2017

STRENGTH OF MATERIALS - I (Revised)

Sub. Code : 63340

Day and Date :Wednesday, 15 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non - programmable calculator is allowed.**
4) **Assume any suitable data if required and state it clearly.**

SECTION - I

Q1) a) Explain with neat diagram, Stress-Strain Curve of mild steel rod under axial tensile force. **[4]**

b) The rod ***ABC*** is made of an aluminum for which E = 70 GPa as shown in Fig. 1. Knowing that ***P*** = 6 kN up at point ***A*** and ***Q*** = 42 kN down at point B, determine the deflections at point A and point ***B***.***AB*** = 0.4 m and 20 mm dia, ***BC***= 0.5 m and 60 mm dia. **[13]**

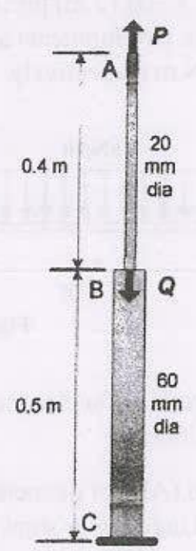


Fig. 1

OR

a) Explain Saint-Venant's principle with neat diagrams. **[4]**

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P.T.O.

b) At room temperature (21° C) a 0.5 mm gap exists between the ends of aluminum and steel rods of lengths 300 mm and 250 mm respectively as shown in Fig. 2. When temperature is reached 160°C, determine normal stress in aluminum bar and change in length of aluminum bar. **[13]**

Aluminum rod: Area = 1806 sq.mm, E_A= 72 GPa, α_A = 23.9 x 10^{-60}/C.
Steel rod: Area = 774 sq.mm, Es= 190 GPa, α_s = 17.3 x 10^{-60}/C

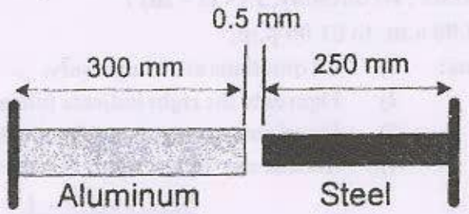


Fig. 2

22) a) Explain with neat diagrams, relationship between load, shear force and bending moment. **[4]**

b) Draw Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for a cantilever beam ABC of length 3 m, fixed at A and free at C as shown in Fig. 3. AB (2 m) portion is loaded with uniformly distributed load of I kN/m, two moments are applied at B and C with magnitude 2 kN.m and 3 kN.m respectively. **[13]**

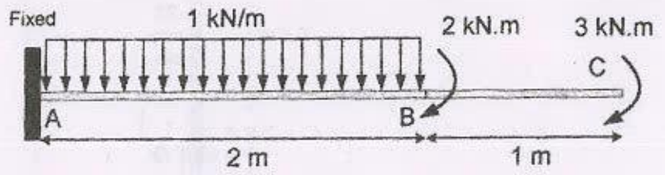


Fig. 3

23) a) Derive an expression for circumferential stress and longitudinal stress in thin walled cylinders. **[4]**

b) Two rods, steel (AB) of diameter 38 mm and brass (BC) of diameter 46 mm connected together as shown in Fig. 4. If allowable shear stresses in steel and brass rods are 104 MPa and 55 MPa, find largest torque T applied atA. **[12]**

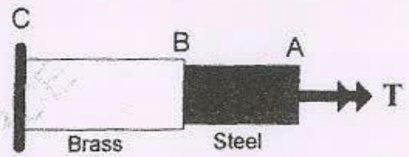


Fig. 4

SECTION - II

24) a) A beam 80 mm × 120 mm is 4 m long simply supported at its ends. The beam supports a central load W at the center of span of beam. If the maximum bending stress is limited to 4000 N/sq.cm. Find the value of W when. **[9]**

i) Smaller dimension is used as depth

ii) Greater dimension is used as depth.

b) A cantilever beam of span 3 m carries uniformly distributed load of 2 kN/m. If the beam is of rectangular cross section, whose depth is twice the width of section, find width and depth of the beam. Allowable bending stress is 14000 N/sq.cm. **[8]**

25) a) Draw shear stress distribution diagrams for I and T sections with maximum and average values. **[4]**

b) T sectional steel beam having flange of 100 mm × 20 mm and web 10 mm × 150 mm. Draw shear stress distribution across the depth of the section. If the beam is simply supported over a span of 5 m subjected to uniformly distributed load of 40 kN/m over entire span. **[13]**

26) A weight of 25 kN falls through 40 mm on a collar rigidly attached to the lower end of vertical steel bar of length 3.5 m and having area of 6.5 cm^2. What is the instantaneous maximum stress and corresponding instantaneous maximum strain of the bar. Take E_s = 200 GPa **[16]**

SF-11

Total No. of Pages : 3

Seat No.	

S.E. (Civil) (Semester - III)
Examination, November - 2017
SURVEYING - I
Sub. Code : 63339

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Answer any THREE questions from EACH section.**
2) **Figures to the RIGHT indicate FULL marks.**
3) **Assume suitable data if NECESSARY and state them clearly.**
4) **Answers shall be supported by adequate sketches.**

SECTION - I

Q1) Solve (6 marks each) **[18]**

a) Explain test and adjustment for setting the bubble axis parallel to line of collimation for dumpy level.

b) Explain auto level with diagram of tilt compensator.

c) Derive expression for correction for curvature and refraction.

Q2) a) State and explain significance of temporary and permanent adjustments for a Level. **[8]**

b) While carrying out two peg test following data are collected for a level **[8]**

Distance AB= 100 m

Instrument at C, 50 m i.e. midway between A&B

Reading at A = 2.5 m reading at B = 3.5 m

Instrument at D in line AB 25 m from B such that AD= 125 m

Reading at A= 2.0 m reading at B = 3.25 m

If the instrument is to be adjusted what procedure will you follow?

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)3) a) The perpendicular offsets taken at 10m interval from a survey line to an irregular boundary are 2.25,3.85 ,4.5 ,6.8,5.2 ,7.35 ,8.9,8.3, & 5.45 m. determine the enclosed area by **[8]**

i) Average ordinate rule

ii) Trapezoidal rule

iii) Simpson's rule.

b) Define area of zero circle and methods for calculating area of zero circle. Explain any one method in detail. **[8]**

)4) Writes short notes on **[16]**

a) Resectioning in plane table survey.

b) Plane table and its accessories.

c) Block contouring.

d) Factors affecting sensitivity of level tube.

SECTION - II

)5) a) What is the purpose of **[16]**

i) Making face left and face right observations.

ii) Observing the readings on both the verniers.

iii) Repetition method of horizontal angle measurement.

b) Explain stepwise procedure of measuring horizontal angle by reteration method. Also indicate under what circumstances it is preferred. **[6]**

c) Name the fundamental lines of a transit theodolite and also indicate their inter-relationships. **[5]**

)6) a) From the following observations on the traverse ABCD, calculate the length and bearing of the line AB. **[9]**

Line	CA	CD	DB
Length in m.	66.25	330.20	150.00
Bearing	250°45'	15° 20'	270° 15'

b) Explain stepwise procedure for carrying out theodolite traversing. Also, explain the sequential procedure of obtaining total co-ordinates from Gale's traverse table. **[8]**

)7) a) What are Ranges? Name different types of Ranges and their significance. **[5]**

b) Explain how leveling work is carried out in tunnel surveying. **[5]**

c) Explain the construction and use of Nautical sextant. **[7]**

)8) a) Explain by deriving necessary expressions the Double plane method to determine the reduced level of tip of an elevated tower. **[8]**

b) Calculate the length of CD and bearing of the line AB from the following traverse observations. **[8]**

Line	AB	BC	CD	DA
Bearings	Roughly East	178°0'	270° 0'	1° 0'
Length in m.	150.00	75.50	Not obtained	63.00

✦ ✦ ✦

Q6) Attempt any two of the following: [16]

a) Evaluate $\int_0^{1+i} (x^2 - iy)dz$ along the path

i) $y = x$

ii) $y = x^2$

b) Prove that $u = x^2 - y^2$ and $v = \frac{y}{x^2 + y^2}$ are harmonic functions of (x,y) but are not harmonic conjugates.

c) If $f(z) = u+iv$ is an analytic function of $z = x+iy$ and

$u-v = e^{-x}[(x-y)\sin y - (x+y)\cos y]$ find $f(z)$

♦ ♦ ♦

Total No. of Pages : 4

Seat No.	

S.E. (Civil Engg.) (Semester - III)
Examination, November - 2017
ENGINEERING MATHEMATICS - III
Sub. Code : 63338

Day and Date : Friday, 10 - 11 - 2017 **Total Marks : 100**
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of Calculator is allowed.

SECTION - I

Q1) Solve any three of the following. [18]

a) $(D^2 - D + 1)\, y = \cos 2x$

b) $(D^2 + 1)\, y = x^2 \sin 2x$

c) $(D^2 + 3D + 2)\, y = e^{e^x}$

d) The differential equation satisfied by a beam uniformly loaded with one end fixed and second subjected to a tensile force P is given by

$$EI\frac{d^2y}{dx^2} = Py - \frac{1}{2}Wx^2$$

Show that elastic curve for the beam under conditions $y = 0$, $\frac{dy}{dx} = 0$ at $x = 0$ is given by $y = \frac{W}{Pn^2}(1 - \cosh nx) + \frac{Wx^2}{2P}$ where $n^2 = \frac{P}{EI}$.

Q2) Attempt any two of the following. [16]

a) Find the directional derivative of $\phi = x^4 + y^4 + z^4$ at the point A(1, –2, 1) in the direction of AB where B is (2, 6, –1). Also find the unit vector normal to the surface $2x^2 + 4yz - 5z^2 = -10$ at (3, –1, 2).

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b) A vector field $\bar{F}$ is given by $\bar{F}=(x^2-yz)i+(y^2-zx)j+(z^2-xy)k$.

Show that $\bar{F}$ is irrotational and find its scalar potential. Also find Grad (div $\bar{F}$)

c) If $\bar{a}$ is a constant vector and $\bar{r}=xi+yj+zk$ then prove that

i) $\nabla(\bar{a}\cdot\bar{r})=\bar{a}$

ii) div $(\bar{a}\times\bar{r})=0$

iii) div $(\bar{a}\cdot\bar{r})\cdot\bar{a}=a^2$

iv) curl $(\bar{a}\times\bar{r})=2\bar{a}$

Q3) Attempt any two of the following. **[16]**

a) Fit a first degree curve to the following data and estimate the value of y when $x=73$

x:	10	20	30	40	50	60	70	80
y:	1	3	5	10	6	4	2	1

b) For the following data fit a curve of the form $y=ax^b$

$x=$	1	2	3	4	5	6
$y=$	1200	900	600	200	110	50

c) From the following data find the line of regression of y on x and of x on y

$x=$	62	64	65	69	70	71	72	74
$y=$	126	125	139	145	165	152	180	208

SECTION - II

Q4) Attempt any two of the following: **[16]**

a) Seven coins are tossed and the number of heads obtained is noted. The experiment is repeated 128 times and the following distribution is obtained.

No.of heads	0	1	2	3	4	5	6	7
Frequency	7	6	19	35	30	23	7	1

Fit a binomial distribution if (i) the coins are unbiased (ii) the nature of coins is not known.

b) A firm produces articles of which 0.1 percent are defective. It packs them in cases each containing 500 articles. If a wholesaler purchases 100 such cases, how many cases can be free from defectives, how many can be expected to have one defective.

c) In a sample of 1000 students, the mean marks of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find

i) how many students score between 12 and 15 marks?

ii) how many students score above 18 marks?

iii) how many students score below 8 marks?

iv) how many students score 16 marks?

(Given: For S.N.V.Z area between Z=0 to 0.4 is 0.1554, area between Z=0 to Z = 0.6 is 0.2257, area between Z=0 to Z = 0.8 is 0.2881, area between Z=0 to Z=1 is 0.3413, area between Z=0 to Z= 1.6 is 0.4452, area between Z=0 to Z=2.4 is 0.4918)

Q5) Attempt any three of the following. **[18]**

a) Find the Laplace transform of $\frac{\sin t\sin 5t}{t}$

b) Find the Laplace transform of $e^{-3t}\int_0^t u\sin 3u\,du$

c) Find the inverse Laplace transform of $\frac{s}{(s^2+1)(s^2+4)}$ using convolution theorem.

d) Use Laplace transform to solve $(D^2+4D+13)y=e^{-t}\sin t$ where $y(0)=0$ and $y'(0)=0$.

SF-13

Total No. of Pages : 2

Seat No.	

S.E. (Civil) (Part - II) (Semester - III) (Revised) Examination, November - 2017

BUILDING CONSTRUCTIONS & MATERIALS

Sub. Code : 63342

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of electronic calculator is permitted.**
4) **Assume suitable data if necessary and mention it clearly.**

SECTION - I

Q1) a) Classification of bricks according to IS standards? Also state water absorption and crushing strength limit for the same? **[8]**

b) Draw Cross section through external framed structure wall showing all components in sub structure mentioning their functional consideration. **[8]**

Q2) a) Draw a neat sketch of one and one and half brick thick Flemish Bond masonry. **[10]**

i) Plan of Odd and Even Course.

ii) Elevation for at least six courses.

b) State various types of material used for partition wall. **[6]**

Q3) Write short notes on any three : **[18]**

a) Door fixtures and fastening.

b) Lift.

c) Construction of Wall strip Foundation.

d) Rat trap bond.

e) Arches and their stability consideration.

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P.T.O.

SECTION - II

Q4) Design and draw quarter turn staircase to a scale of 1 : 20 the plan and sectional elevation for following data **[25]**

a) Storey height : 3.20 m

b) Staircase internal size 4.8 × 5.8 m

c) Assume data wherever necessary.

Q5) Draw to a scale of 1 : 20 a sectional plan, side view and elevation for T.W. Paneled window for following data. **[25]**

a) Clear opening : 1.5 m × 1.2 m

b) Frame : 125 mm × 75 mm

c) End Style and meeting style : 120 mm × 40 mm

d) Rails : 120 mm × 40 mm

e) Panel material : partly glazed partly teak wood

f) Panel thickness : 20 mm

g) Glass : 4 mm thickness

h) No of shutter : 2 nos

i) No of panel : 4 nos

j) Shows various window fixtures and fastening.



SUK-BCE

SF - 18

Total No. of Pages : 2

Seat No.	

S.E. (Civil) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

BUILDING DESIGN AND DRAWING

Sub. Code: 63348

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

3) **Assume suitable data if required and clearly mention it.**

SECTION - I

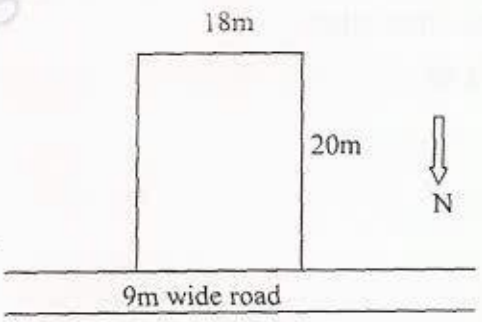
Q1) a) Explain the concept of F.S.I. **[5]**

b) Explain : Site Plan. **[5]**

OR

b) Write short note on 'Circulation' principle of a building planning. **[5]**

Q2) Plan a bungalow (G+1) on the given plot. The requirements are as below,



Name of Room	Tentative Size
Living Room	4 m X 5 m
Children Bed Room	5 m X 3.5 m
Master Bed Room	3.5 m X 4.5 m
Guest Bed Room	3 m X 4 m
Verandah	2.5 X 3 m
Store	1.3 X 2.5 m
Staircase	Suitable Size

Assume any other suitable data.

External walls – 230 mm thick. Internal walls – 150 mm thick.

P.T.O.

SUK-BCE

Draw to a suitable scale the following:

i) Building Plans (Ground and First Floor) [25]

ii) Furniture layout of Living Room [5]

Q3) Write short notes on any ***two:*** [10]

a) Aspect

b) Building Permission

c) Maintenance of building

d) Green building

SECTION - II

Q4) a) Explain the systems of plumbing with sketches. [10]

b) Explain : Intercepting Trap [6]

OR

b) Explain the types of wiring system. [6]

Q5) a) Explain the systems of ventilation with help of sketches. [10]

b) Explain the concept of thermal insulation. [6]

OR

b) Explain : Acoustics [6]

Q6) Write short notes on any ***three:*** [18]

a) Types of Pointing.

b) Characteristics of good paint.

c) Summer air conditioning.

d) Rain water harvesting.

e) Fire resisting building materials.

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SF-97

Total No. of Pages : 3

Seat No.	

B.E. (Mech) (Part - IV) (Semester - VII) (Revised) Examination, November - 2017

REFRIGERATION AND AIR CONDITIONING

Sub. Code : 67501

Day and Date : Friday, 10 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :

1) **Attempt all questions.**
2) **Figures to the right indicates full Marks.**
3) **Used same answer book.**
4) **Neat diagram must be drawn.**
5) **Use of steam table, Refrigerant property tables/charts and psychrometric charts are allowed.**
6) **Make suitable assumptions if required.**

Q1) Attempt any two.

a) Derive an expression for performance of a reversed carnot refrigeration cycle with vapour refrigerant and mention the limitations. **[8]**

b) Explain reversed Brayton cycle for Air refrigeration, derive, an expression for COP and represent on T-s plot. **[8]**

c) i) Explain the following terms in brief. Energy ratios (EER) and Ton of Refrigeration. **[4]**

ii) A carnot refrigerator requires 1.4KW of power per Ton of refrigeration to maintain a space at -45°C. Determine; COP of a refrigerator and heat rejected in KJ per Ton. **[4]**

Q2) Attempt any two.

a) Explain in detail the methods of improving performance of a vapour compression refrigeration with help of P -H diagram. **[9]**

b) Draw cascade system on P-H and T-S plots with schematic diagram. Explain the System and write the expression for COP. **[9]**

c) A vapour compression system of 12TR capacity maintains an evaporator temperature of -8°c and condenser temperature + 30°c. Vapour is dry and saturated at entry to the compressor and compression is isentropic,

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P.T.O.

Assuming actual COP 60% of the theoretical. Calculate;

i) Power input.

ii) Actual COP.

If Vapour is super heated by 5°c at suction to compressor, Calculate Power input and actual COP. (Assume saturated liquid at end of condenser in both cases.) **[9]**

Take, Cp of vapour is 0.733 KJ/Kg –K. Properties of Refrigerant.

Saturation	Specific Enthalpy		Specific Entropy	
Temperature	Liquid(h_f)	Vapour (h_g)	Liquid (Se)	Vapour (S_g)
–8°c	28.72KJ	184.07KJ	0.149KJ/kg-k	0.7 KJ/K K
+30°c	64.59KJ	199.62KJ	0.240KJ/kg-K	0.685KJ/kg–k

Q3) Attempt any two.

a) Enumerate the desirable properties of a good refrigerant and suggest the refrigerants used in. **[8]**

i) Reciprocating compressor

ii) Centrifugal Compressor.

iii) Axial compressor and justify your answer

b) Write a note on **[8]**

i) Ice plant.

ii) Dairy plant.

c) Describe the working of evaporative condenser with neat sketch. **[8]**

Q4) Solve any two.

a) i) Derive relation between relative humidity and degree of saturation (μ) with usual notations. **[4]**

ii) Explain Enthalpy deviation and show it on Psychrometric chart. **[4]**

b) The moist air is at 25°c DBT and 30% degree of saturation. The total pressure is 1.01325 bar, calculate Enthalpy and volume of air per Kg of dry air. **[8]**

c) Explain adiabatic mixing of moist air with injected water spray with the help of Psychrometric chart. Write the governing equations for the enthalpy and specific humidity. Draw the condition line with help of SHF scale given on the chart. **[8]**

Q5) Solve any two.

a) i) Explain briefly with sketch A.D.P, B.F, capacity of cooling coil and factors affecting them. **[5]**

ii) Write only the equation for air quantity over a cooling and dehumidifying coil using ESHF, ADP and B.F. **[4]**

b) Draw only the neat sketch of comfort chart giving numerical values. Explain human body regulatory process against heat and cold. **[9]**

c) The air at 30.5°c DBT and 55% R.H enters cooling coil at the rate of 300 cmm. The coil ADP is 13°c and BF is 0.1667. Calculate water vapour condensed and S.H.F using S.H.F Scale given on the chart. **[9]**

Q6) Solve any two.

a) Enumerate the sources of heat load for central Air conditioning system used for large building. **[8]**

b) Explain methods used for duet sizing in brief for supply air and return air. **[8]**

c) Write short notes on. **[8]**

i) Air distribution requirements.

ii) Types of outlets.

iii) Grilles.

iv) Diffusors.

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SF-99

Total No. of Pages : 3

Seat No.	

B.E. (Mechanical) (Semester-VII) (Revised) Examination, November - 2017
FINITE ELEMENT ANALYSIS
Sub. Code : 67503

Day and Date : Wednesday, 15-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data if necessary and state it clearly.**
3) **Figures to the right indicate full marks.**

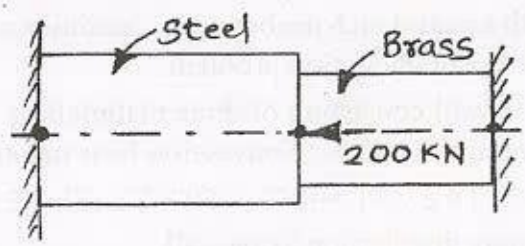
Q1) a) Explain in detail the general steps of finite element analysis. **[7]**

b) Explain the principle of minimum potential energy with the help of an example. **[7]**

OR

b) If a displacement field is described by $u = (-x^2 + 2y^2 + 6xy)*10^{-4}$ and $v = (3x + 6y - y^2)*10^{-4}$ determine ε_x, ε_y, γ_{xy} at the point $x = 1$, $y = 0$. **[7]**

Q2) a) Calculate the displacements, stress, strain and reactions for a stepped bar as shown in figure. Given: $A_{steel} = 400\ mm^2$; $A_{brass} = 300\ mm^2$; $L_{steel} = 500$ mm; $L_{brass} = 300$ mm; $E_{steel} = 200$ GPa; $E_{brass} = 70$ GPa; **[10]**



b) Derive the shape functions for a one dimensional quadratic element and sketch the variation of each shape function along the entire element. **[8]**

OR

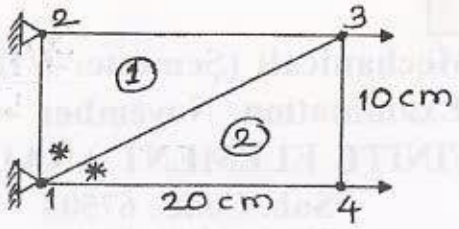
b) Explain the elimination and penalty method with the help of an example. **[8]**

Q3) a) Classify the elements by virtue of their interpolation function and state their merits and demerits. **[6]**

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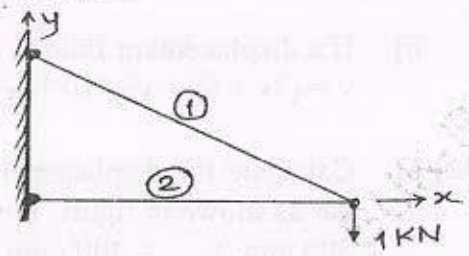
b) Calculate the shape functions for the elements shown in figure [12]



Q4) a) A long cylinder of inside diameter 80mm and outside diameter 120mm snugly fits in a hole over its full length. The cylinder is then subjected to an internal pressure of 2 MPa. Draw the sketch showing actual problem and also model the problem for a sample length of 10mm using two axisymmetric triangular elements with proper forces and boundary conditions. Also show the element connectivity table and coordinates of all nodes. [8]

b) Calculate the displacements in global coordinate and local coordinate systems for a truss shown in figure. [10]

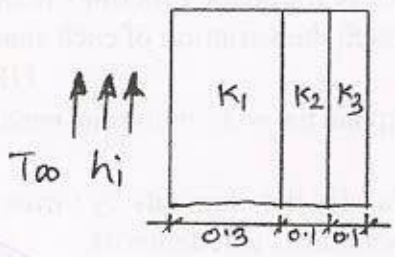
$A_1 = 80\ mm^2$
$A_2 = 40\ mm^2$
$L_1 = 1000\ mm$
$L_2 = 800\ mm$
$E_1 = E_2 = 200\ GPa$



Q5) a) Explain with a neat sketch the boundary conditions for a two dimensional steady state heat conduction problem. [6]

b) A composite wall consisting of three materials as shown in figure. The outer temperature is 40°C. Convection heat transfer takes place on the inner surface of the wall with $T_\infty = 500°C$ and $h = 25\ W/m^2°C$. Determine the temperature distribution in the wall. [8]

$k_1 = 20\ W/m\ °C$
$k_2 = 30\ W/m\ °C$
$k_3 = 50\ W/m\ °C$
$T_o = 40\ °C$
$L_1 = 0.3\ m$
$L_2 = 0.1\ m$
$L_3 = 0.1\ m$



Q6) a) Explain in detail the steps to be carried out in commercial FEA software for obtaining the displacement in a stepped bar each of length L/2, fixed at one end and subjected to axial force P at the other end. [12]

b) Explain the measures of element distortion in a finite element analysis package. [6]

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Total No. of Pages : 2

Seat No.	

B.E. (Mechanical) (Part - IV) (Semester-VII) Examination, November - 2017

AUTOMOBILE ENGINEERING (Elective - 1)

Sub. Code : 67506

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat sketch wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Make suitable assumption if necessary.**
5) **Use of non-programmable calculator is allowed**

Q1) a) Compare the front engine front wheel drive and front engine rear wheel drive with its advantages and disadvantages. **[8]**

b) Which are the different types of vehicle body? List the body parts. **[8]**

Q2) a) Describe briefly parts of the clutch. With its function. **[8]**

OR

How are the clutches are classified? Explain with neat sketch diagram spring type. Clutch.

b) What is a need of differential. Explain its operation with neat sketch. **[9]**

Q3) a) Explain steering geometry. **[9]**

OR

What is mean by slip angle, understeer and oversteer.

b) Which are the different types of springs used in suspension system. **[8]**

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Q4) a) Define following and explain it relevance. **[8]**

i) Brake efficiency
ii) Stopping distance
iii) Braking force
iv) Power brakes.
v) Servo brakes
vi) Anti lock braking
vii) Brake bleeding
viii) Brake fadding

b) What are the various tyre nomenclature, show with a figure? List factors affecting tyre performance. **[8]**

OR

c) Explain need and effect of ABS in automotive brakes. Explain how safety can be improved with the help of ABS. **[8]**

Q5) a) Explain with neat sketch working of lead acid battery. List and explain battery performance parameters and how to measure then? **[8]**

b) Explain with neat sketch Electronic controlled management system used in automobile showing all necessary components. **[9]**

OR

c) Explain with neat sketch alimetiser automotive air conditioning system. **[9]**

Q6) a) Following are the vehicle specifications, wt. of vehicle = 62.29 KN, Kr=0.018 Ka = 0.0276, Transmission efts, in top gear = 90 %, Top gear ratio = 6.2, second gear ratio = 15, transmission efficiency in second gear = 80%, frontal area = 5.574 m^2, wheel dia = 0.81 mts, **[12]**
Calculate.

i) Engine power required.
ii) Engine speed required.
iii) Maximum possible grade in second gear at above speed.
iv) Maximum drabar pull in second gear at above speed.

b) Write a note on various resistances to vehicle motion. **[5]**

OR

c) What B effect of wt. Distribution on vehicle performance and drive selection. **[5]**

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SF - 103

Total No. of Pages :2

Seat No.	

B.E. (Mechanical Engineering) (Semester - VII) Examination, November - 2017

TOTAL QUALITY MANAGEMENT (Elective - II)

Sub. Code: 67833

Day and Date :Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumptions wherever necessary and state them clearly.**
4) **Use of statistical tables and scientific calculator is permitted.**

Q1) Solve any Two.

a) Track the journey-Inspection, Quality Control, Quality Assurance and Quality Management. **[8]**

b) Enumerate customer compliant redressal mechanism being followed in an organization known to you. **[8]**

c) What are the needs, wants and expectations of Internal Customers? **[8]**

Q2) Solve any Three.

a) How Quality of design and quality of conformance decided? **[6]**

b) How control over vendor quality is established? **[6]**

c) Describe seven QC tools used in problem solving process. **[6]**

d) What is Six Sigma? What are the steps involved in implementing it in an organization? **[6]**

Q3) Solve any Two.

a) What do you mean by parallel, series and combined system reliability? Give suitable examples. **[8]**

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b) What are the applications of reliability tests? [8]

c) Three subsystems are reliability - wise in series and make up a system. Subsystem 1 has a reliability of 94.6%, subsystem 2 has a reliability of 99.7% and subsystem 3 has a reliability of 92.8% for a mission of 100 hours. What is the overall reliability of the system for a 100 hour Mission? [8]

Q4) Solve any Two.

a) How TQM differs from tradional management approach? [8]

b) What are the focus areas of Theory of Constraints? Prepare a brief write up on Feignbaum's theory of TQC. [8]

c) Explain any one approach to TQM followed by an organization known to you. [8]

Q5) Solve any Three.

a) Quality Policy deployment and quality function deployment lead to increase in customer satisfaction. How? [6]

b) An organization wishes to develop quality culture. How TQM can help the organization? [6]

c) Quality objectives should be SMART. Give a list of quality objectives set by an organization based on SMART philosophy. [6]

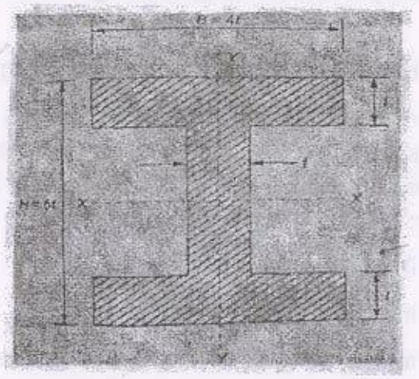
d) Share details of any TQM technique implemented by an organization. Has it been successful? If yes, why? If no, why? [6]

Q6) Solve any Two:

a) Elaborate SERVQUAL model in details. [8]

b) What are the steps involved in implementation of ISO : 9001:2008. [8]

c) What are the criteria used to decide winner of CII - Exim Quality Award? [8]



$$(A)=11t^2,\ I_{xx}=\left(\frac{419}{12}\right)t^4 \text{ and } y=\left(\frac{5t}{2}\right)$$ [8]

Q6) a) What is adequate design and Optimum design? Explain with suitable Examples? [8]

OR

a) Explain relation between functional requirement parameters group, geometrical parameters group and material parameters group in the optimum design of machine Elements. [8]

b) A tensile bar of length 500mm is subjected to the constant tensile force of 3000N. If the factor of safety is 2, design the bar with the objective of minimizing the material cost, out of the following materials [8]

Sr.No.	Material	Mass Density (ρ)Kg/m^3	Material Cost Per Unit Mass (c) Rs/Kg	Tensile Yield Strength (S_{yt}) N/mm^2
01	Plain carbon steel	7800	28	400
02	Alloy steel	7850	150	900
03	Aluminium Alloy	2800	132	150
04	Titanium Alloy	4500	2200	800

Total No. of Pages : 4

Seat No.

B.E. (Mechanical) (Semester - VII) (New Course)
Examination, November - 2017
MECHANICAL SYSTEM DESIGN
Sub. Code : 67502

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary and state it clearly.**
3) **Draw neat labeled sketches wherever necessary.**

Q1) a) With suitable example, explain effect of appearance, shape, colour and proportion in Aesthetic Design. [8]

b) Explain ergonomic consideration in design of Pressure Cooker. [8]

OR

b) What is creativity and explain the role of creativity in the design of a product. [8]

Q2) a) Explain the concept of pre-stressing in thick pressure vessels with suitable examples. [6]

OR

a) Classify unfired pressure vessels as per IS 2825-1969 code. [6]

b) A cylindrical pressure vessel shell of inside diameter 1500mm is subjected to an internal pressure of 2 MPa .The shell as well as heads are made of low alloy steel with an ultimate tensile strength of 450N/mm^2. The double welded butt joints which are spot radiographed (η= 0.85) ,are used to fabricate the vessel. The corrosion allowance is 3mm. Determine the thickness of the cylindrical shell and the thickness of the head if the heads are: [12]

i) Flat Head
ii) Plain Formed
iii) Hemispherical
iv) Torispherical with crown radius of 1125mm

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3) a) Explain with neat sketches self-energizing, self - locking and uncontrolled braking conditions in short shoe block brake. [8]

b) A multi-disk plate clutch consists of five steel plates and four bronze plates. The inner and outer diameters of the friction disks are 75 and 150mm respectively. The coefficient of friction is 0.1 and the intensity of pressure on friction lining is limited to 0.3 N/mm². Assuming uniform wear theory, calculate: [8]

i) Required force to engage the clutch and

ii) Power transmitting capacity at 750 rpm.

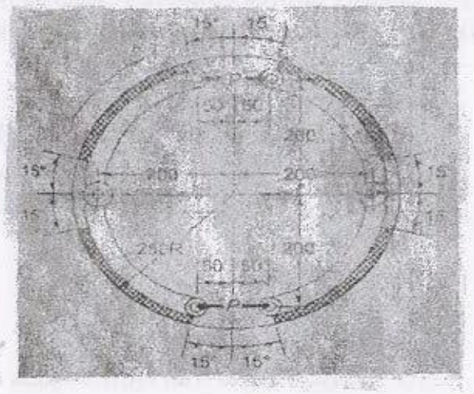
OR

b) An internal expanding brake with four identical shoes is shown in figure below. Each hinge pin supports a pair of shoes . The actuating mechanism is designed in such a way that it produces the same force P on each of the four shoes . The face width of the friction lining is 50 mm and the maximum intensity of normal pressure is limited to 1N/mm². The coefficient of friction is 0.30 [8]

Calculate :

i) The actuating force P.

ii) The torque absorbing capacity of the brake.



4) a) Basic considerations in design of multi speed gear box. [6]

OR

a) Explain the procedure for selecting optimum structure diagram. [6]

b) A three-stage, twelve speed gear box is to be designed for multi spindle speeds varying between 60 r.p.m and 2880 r.p.m. The second stage consists three speed steps if the gear box is driven by 5kW, 1440 r.p.m. electric motor: Assume same module for all gears. [12]

i) Draw the speed ray diagram.

ii) Draw the gearing diagram.

iii) Determine the number of teeth on gears.

5) a) Explain briefly guidelines for design of piston ring. [8]

b) The cylinder of a four stroke diesel engine as the following specifications [8]

Brake power = 3.00 kW.

Speed = 800 rpm.

Indicated Mean Effect Pressure = 0.30 MPa.

Mechanical Efficiency = 70%

Determine the bore and length of the cylinder liner.

OR

b) The following data is given for a connecting rod:

Engine speed =2000rpm.

Length of connecting rod =300mm.

Length of stroke = 160mm.

Density of material =7800 kg/m³

Thickness of web or flanges = 6 mm

Assume the cross-section of the connecting rod as shown in figure for which Area of cross section, calculate the whipping stress in the connecting rod.

SF - 40

Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VII) (Old)

Examination, November - 2017

EARTHQUAKE ENGINEERING

Sub. Code: 47903

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :

1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data whenever necessary.**
4) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION-I

Q1) a) What are causes of earthquake? Explain in brief plate tectonic theory. **[8]**

b) Classify and describe with suitable sketches, different types of seismic waves generated by an earthquake. **[8]**

Q2) a) Define Logarithmic decrement, how it is measured and derive the equation of Logarithmic decrement. **[7]**

b) The building frame shown in the Fig.1 is given a 100 mm lateral displacement and released from the rest to vibrate freely. Find the logrithmatic decrement and displacement of the system afte 12 cycles and comments on the result. Consider 10% damping. Take $EI_{column} = 1.1 \times 10^{12}$Nmm. **[9]**

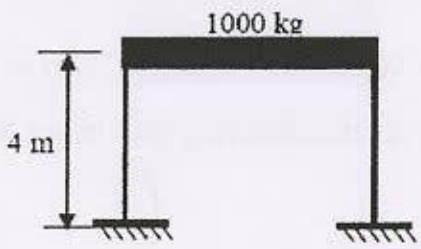


Fig. 1

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Q3) a) Explain in details Force Transmission Ratio. **[05]**

b) A SDOF system consists fo 5 m high column of 600 mm diameter which supports the heavy mass of 10500 kg at its top. The system is subjected to a harmonic force of 1800 sin50t N. Consider 20% damping and E = 2×10^5. Calculate the maximum dynamic amplitude and also state whether the system will have resonance or not? **[11]**

Q4) Calculate the base shear for a five storey hospital building having special moment resisting frame (SMRF) located in Pune on medium soil with following data using seismic coefficient method. **[18]**

a) No. of bay in x and y-direction = 4

b) Width of each bay = 5m

c) Thickness of slab = 150 mm

d) Storey height = 3.2 m

e) Size of beam and column = 300 mm × 450 mm

f) Amount of damping = 5% of critical damping

g) Live load = 4kN/m^2

Assume any additional data if required and neglect the weight of the infill wall panels.

SECTION-II

Q5) a) Explain earthquake design philosophy for building. **[8]**

b) Explain soft storey? Explain how soft storey probelms can be eliminated in the existing buildings. **[8]**

Q6) a) Explain how "ductility of building" can be effectively designed. **[8]**

b) What are the ductile detailing provisions for column? Explain with neat sketches. **[8]**

SUK-BCE

Q7) a) What points should be kept in mind while designing earthquake resistant brick masonry structure? **[8]**

b) Discuss in detail the advantage of horizontal bands and vertical reinforcement in the masonry buildings. **[8]**

Q8) Write a short note (Any three): **[18]**

a) Stud Wall Construction.

b) Strong column and weak beam.

c) Effect of soft storey of RC structure.

d) Jacketing of column.

EEE

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Seat No.	

Total No. of Pages : 2

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

SOLID WASTE MANAGEMENT (Elective-I)

Sub. Code : 67569

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any two of the following: **[2×8=16]**

a) What is Solid Waste and Solid Waste Management? Write the objectives of SWM.

b) State the composition of MSW. Describe the compositions.

c) Write note on Biomedical Waste Management.

Q2) Answer any two of the following: **[2×9=18]**

a) Explain with the help of flow diagram, the functional elements of Municipal Solid Waste Management.

b) Explain the methods of solid waste collection with a neat sketch.

c) Explain in detail with help of figure the different types of Transfer Station.

Q3) Answer any two of the following: **[2×8=16]**

a) List out the different equipment used for processing solid waste and explain any one with neat sketch.

b) What is MRF? Explain the processes for MSW at these facilities with flow diagram.

c) Explain with the figure the different types of air classifiers methods.

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SECTION-II

Q4) Answer any two of the following: **[2×9=18]**

a) What is Sanitary landfilling? Write the site selection criteria for sanitary landfilling.

b) Draw the cross section of sanitary landfill and explain the essential components.

c) Identify the adverse effects of a landfill leachate and its appropriate control measures.

Q5) Answer any two of the following: **[2×8=16]**

a) What is composting? Explain composting process of bio degradable MSW.

b) Explain mechanical composting plant with flow diagram.

c) Explain the different factors affecting composting.

Q6) Answer any two of the following: **[2×8=16]**

a) Explain the working of an incinerator with a neat sketch.

b) Write the air pollution problem associated with incineration system and its control techniques.

c) Describe pyrolysis and its products.

✈ ✈ ✈

SF-38

Total No. of Pages : 2

Seat No.	

B.E. (Civil) (Semester-VII) Examination, November - 2017
GROUND IMPROVEMENT TECHNIQUES (Elective-I)
Sub. Code : 67571

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Que. No. 1 from section-I and Que. No. 5 from section-II are compulsory.**
2) **Solve any two other questions from each of the section.**
3) **Figures to the right indicates full marks.**

SECTION-I

Q1) Answer the following: **[4×5=20]**

a) Explain the various types of vertical drains used in ground improvement.

b) What is mean by dynamic consolidation.

c) Explain use of stone column as ground improvement method.

d) Enlist various ground improvement technique according to their suitability.

Q2) a) How do vertical drains improve the functioning of pre-loading? Explain with neat sketch. **[8]**

b) Explain various components of ground Anchor. **[7]**

Q3) a) Explain design procedure of stone column. **[8]**

b) Explain construction sequence of soil nailing. **[7]**

Q4) Write a short note on **[3×5]**

a) Classification of ground improvement technique

b) Soil nailing

c) Rock Anchor in grannuar soil

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SECTION-II

Q5) Answer the following: **[4×5=20]**

a) Enlist various factor affecting the soil stabilization.

b) Explain the earth reinforcement mechanism.

c) Write down the various application of earth reinforcement.

d) Enlist different types of geosynthetics.

Q6) a) Compare and enlist the various method of soil stabilization. **[8]**

b) Explain the various application of geosynthetics with respect to

i) reinforcement ii) separator

iii) filter iv) drainage **[7]**

Q7) a) Explain the stress-strain relationship of reinforced soil. **[8]**

b) Explain the various types of grout used in ground improvement. **[7]**

Q8) Write a short note on: **[5×3]**

a) Function of geosynthetics

b) Fly-ash soil stabilization

c) Selection of geosynthetics



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Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Part - IV) (Semester - VIII)
Examination, November - 2017
DESIGN OF CONCRETE STRUCTURES - II
Sub. Code : 67748

Day and Date : Wednesday, 1 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary and mention it clearly.**
4) **Use of non programmable calculator is allowed.**
5) **Use of relevant IS Codes are allowed.**

SECTION - I

Q1) Design rectangular beam for limit state of collapse in torsion for following data. **[16]**

Size of beam = 400 × 700mm, over all

Factored Shear force = 95 KN

Factored Bending moment = 180 KN.m

Factored Torsion Moment = 55 KN.m

Effective cover = 50mm

Use M20 and Fe 415

Q2) A RCC beam ABCD spanning over four supports carries a live load of 12KN/m and dead load from walls 300mm, 2.8 high. If M20 grade concrete and Fe 415 grade steel is to be used. Design the continuous beam using IS-456 - 2000 provision. Span AB = BC = CD = 6m Take unit weight brick wall 19KN/m^3. Draw a sketch showing reinforcement details. **[16]**

Q3) Design a square water tank resting on ground having dimensions 4m × 4m and height of water is 3m. Assume free board of 0.2m. Use M20 and Fe 415 grades. **[16]**

P.T.O.

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Q4) a) Write a note on balanced, under reinforced and over reinforced section as per WSM. **[9]**

b) Explain the concept of moment of redistribution. **[9]**

SECTION - II

Q5) a) Explain in details three concepts of pre-stress concrete section in analysis. **[8]**

b) Explain systems of pre-stressing with figures. **[8]**

Q6) A pre-stressed concrete beam of rectangular section 300mm × 600mm has a span of 10m. The effective pre-stressing force is 980KN at constant eccentricity of 120mm. The dead load of beam is 4.5KN/m and the beam has to carry a live load of 7.5KN/m **[16]**

Determine the extreme stresses,

a) At the end section

b) At the midsection without action of live load

c) At mid section with action of live load.

Q7) A post tensioned pre-stressed concrete beam of 16m span is subjected to an initial pre-stress of 1458KN. The profile of the cable is parabolic with the maximum eccentricity of 520mm at the center of span. **[16]**

$A = 2.42 \times 10^5 mm^2$, $I = 5.30 \times 10^{10} mm^4$, $As = 1386 mm^2$,

$Es = 2.1 \times 10^5 N/mm^2$, $Ec = 3.82 \times 10^4 N/mm^2$

$\mu = 0.25$, $k = 0.0015/m$, anchorage slip = 2.5mm, creep coefficient = 1.5, $\alpha = 0.13$

Determine the following losses in pre-stress,

a) Elastic shortening.

b) Shrinkage in concrete.

c) Creep in concrete.

d) Slip in anchorage.

e) Frictional loss.

Q8) Design a pre-tensioned concrete rectangular section for the following details

Effective span of beam = 12m.

Live load of intensity = 30 KN/m.

Concrete grade = M 35

Ultimate stresses tendon = 1450 N/mm^2

Loss of pre-stress = 20%

Assume Safe stress is 0.6 times Ultimate stress in tendon.

Permissible stress in concrete at transfer stage is 0.5 σ_{CK}

Permissible stress in concrete at working stage is 0.4 σ_{CK}

Permissible tensile stress in concrete at transfer and working stage is 1.2 N/mm^2 **[18]**

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SUK-BCE

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VIII)
Examination, November - 2017
STRUCTURAL DESIGN OF FOUNDATION AND RETAINING STRUCTURES (Elective - II)
Sub. Code: 67753

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any two questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Use of IS 456- 2000 is allowed.**
4) **Assume suitable data if necessary and mention it clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Two columns A and B 5 m apart between centres carry loads 840 kN and 1200 kN. Design a 2 m wide combined rectangular footing for the columns. The footing shall consist of a central longitudinal beam with cantilevering slabs on either side. Each column is 400 mm × 400mm. The safe bearing capacity of soil is 150 kN/m^2. Use M 20 grade concrete and Fe 415 steel.**[25]**

Q2) A column carrying a load of 2500 kN has to be supported on 4 piles each of size 300 mm × 300 mm. The piles are spaced at 1.00 m centres as shown in figure.1. The column size is 600 mm × 600 mm. Design the pile cap. Use M 20 grade concrete and Fe 415 steel. **[25]**

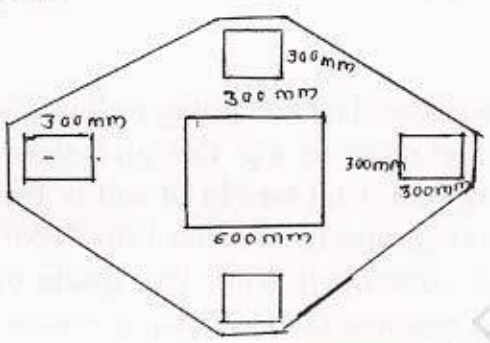


Fig. 1

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Q3) Design a suitable continuous raft foundation connecting the columns of a building 12 m × 12 m shown in figure to suit the following data. **[25]**

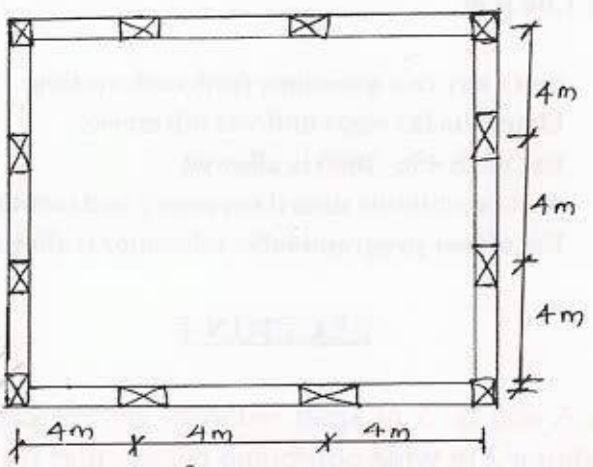
a) Spacing of column = 4 m C/C

b) Service load transmitted = 500 kN on each column.

c) Size of column = 300 mm × 300 mm.

d) Safe bearing capacity = 150 kN/m^2.

e) M 20 concrete and Fe 415 steel.



figure

SECTION-II

Q4) a) Draw neat sketch of well foundation and explain function of each component part in detail. **[12]**

b) Enlist different types of well foundation explain each in detail wiht neat sketch. **[13]**

Q5) A steam of cantilever retaining wall is 3.8m tall, The cantilever retaining wall retains soil up to its top. Design a steam, toe and heel slab of a cantilever retaining wall. Unit weight of soil is 19KN/M^3. The angle of repose is 30°. Safe bearing capacity of soil is 180KN/M^2. The coefficient of friction between soil and concrete is 0.60. Use grade of concrete M_{20} and grade of steel Fe 415. Draw neat sketch showing reinforcement details of cantilever retaining wall. **[25]**

Q6) a) Explain breakwater and its application? Draw a neat sketch and explain vertical wall break water. **[12]**

b) Design armor of rubble mound breakwater if depth of water is 17.0m. Wind velocity is 165Km/Hour. Fetch of wave is 260KM. Allowable bearing pressure on rock is 800KN/M^2. **[13]**

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b) Differentiate between free hold property and lease hold property. [5]

c) Write the significance of sinking fund and derive its expression. [5]

Q8) Write short note on (any three): [18]

a) Building lease and occupational lease.

b) Valuer and his duties.

c) Different types of values.

d) Arbitration.

EEE

Total No. of Pages :4

Seat No.	

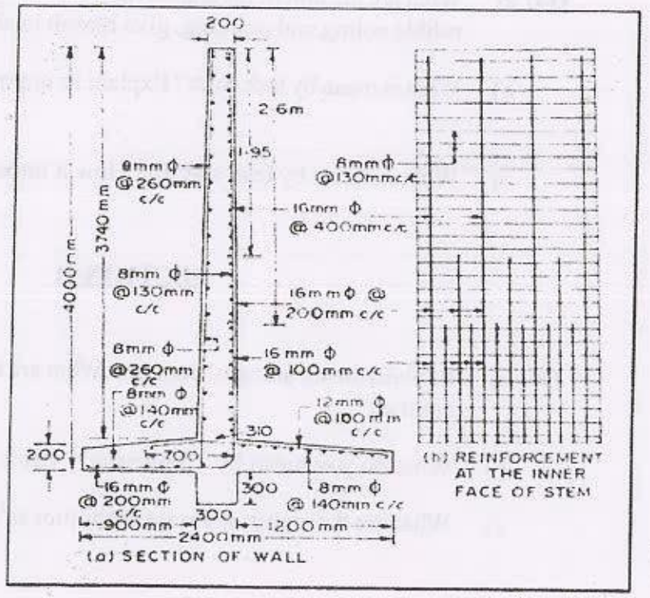
B.E. (Civil) (Semester - VII) (New Course)
Examination, November - 2017
QUANTITY SURVEYING & VALUATION
Sub. Code: 67560

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**
Time :2.30 p.m. to 6.30 p.m.

Instructions :
1) **Q.No. 1 is compulsory.**
2) **Attempt any two questions from remaining questions of section I.**
3) **Attempt any three questions from section II.**
4) **Assume any other additional data if required and state it clearly.**

SECTION-I

Q1) Work out the quantities of below retaining wall 50m in length as stated. **[20]**



P.T.O.

a) Calculate concrete quantity in standard format.

b) Prepare a BBS of given figure in standard format.

Q2) a) Write different types of estimate and state various items to be included in it. **[5]**

b) What is DSR? Prepare analysis of rate for a RCC isolated box footing of area 2.5Ssq.M, and 3.1Sq.M each for a concrete depth 350mm. **[10]**

Q3) a) Which are the various extra charges taken in to account for preparing detailed estimate and why? Explain in detail. **[8]**

b) Write unit of measurement of any three civil engineering items. Write mode of measurement for excavation and concrete. **[7]**

Q4) a) What are the unit of measurement for skirting, door handle, steel sections, rubble soling and pointing, give reason in short. **[5]**

b) What is mean by task work? Explain its importance with suitable example. **[5]**

c) What is mean by lead and lift? How it impacts the cost? **[5]**

SECTION-II

Q5) a) Explain the meaning of contract. What are the reasons of for rejection of contract? **[7]**

b) What do you mean by "Tendering"? Draft a sample tender notice. **[5]**

c) What are the rights and responsibilities of parties of contract. **[5]**

Q6) a) Explain valuation by development method. **[6]**

b) A plot shown in figure is to be valued according to the following details: **[10]**

i) Front width is 50m

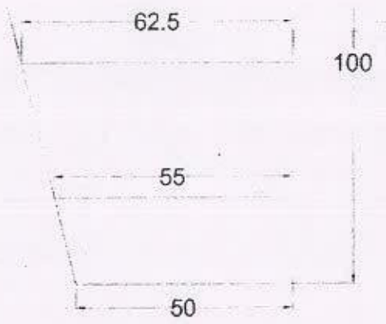
ii) Rear width is 75m

iii) Initial depth is 20m

iv) Market rate of land in the same locality is Rs. 375psm.

Use belting method of valuation.

75



Q7) a) A plate compactor was purchased at Rs. 80,000/-. Assume salvage value to be 10% after 8 years, Calculate depreciation for every year by following methods: **[6]**

i) Straight line method

ii) Constant percentage method.

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Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

PROJECT MANAGEMENT AND CONSTRUCTION EQUIPMENT

Sub. Code : 67561

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt any THREE questions from each Section.**
2) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain the role of various agencies involved in a construction project. **[8]**

b) A project consists of following activities with their duration in days. **[9]**

Activity	1-2	1-3	1-4	2-5	3-6	4-5	4-6	4-7	5-7	6-7
Duration (days)	6	3	4	0	4	12	10	8	5	6

Draw the network. Find out critical path and project duration.

Following conditions exists at the end of 10^{th} day,

i) Activities 1-2, 1-3, 1-4 have been completed as per schedule.

ii) Activities 4-5, 4-6, 3-6 are in progress and will require 6,6 and 1 more days for its completion, respectively.

iii) Other activities have not been started and their duration holds good except activity 5-7 which will require only 3 days instead of 5 days as planned originally.

Update the network.

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)2) a) Explain the concept of Normal and Beta Distribution in P.E.R.T. [8]

b) With the information given in the table draw the network for a construction project. Determine the critical path and its standard deviation. Find Probability of completion of project in 40 days. (For Z = 1.7, Pr. = 95.54%; For Z = 1.8, Pr. = 96.41%) [9]

Activity	Optimistic time	Most likely time	Pessimistic time
1-2	2	5	8
2-3	8	11	20
3-4	0	0	0
2-4	4	7	16
2-5	4	9	20
4-6	7	10	13
5-6	3	7	17
3-7	3	5	13
6-7	2	3	10
7-8	2	4	6

)3) a) Explain various safety equipment used on construction sites. [8]

b) What are the common risks on construction projects? How will you identify these risks? [9]

)4) Write notes on any FOUR. [16]

a) Objectives of Project Management.

b) Milestone Chart.

c) Resource Allocation.

d) Safety Policy.

e) Safety Training.

SECTION-II

)5) a) Explain the construction and operation of Bulldozer with neat sketch. [8]

b) Explain working of Scraper with neat sketch. [8]

)6) a) Explain the construction and working of 'Clamshell'. [8]

b) Enlist various types of compacting equipment. Explain any ONE with sketch. [9]

)7) a) Explain the 'safety measures' in blasting operations. [8]

b) Explain in detail 'Well Point System' of dewatering with neat sketches. [9]

)8) Write notes on any FOUR. [16]

a) Mechanical v/s Manual Construction.

b) Use of Tractors in construction.

c) Tippers.

d) Detonators.

e) Necessity of drainage in excavations.

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Total No. of Pages : 3

Seat No.	

B.E. (Civil Engineering) (Semester - VII)
Examination, November - 2017
EARTHQUAKE ENGINEERING (New)
Sub. Code : 67559

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Assume any suitable data whenever necessary.**
3) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION - I

Q1) a) What is mean by plate boundaries? Explain in details. **[8]**

b) Classify ad describe with suitable sketches, different types of waves generated by an earthquake? **[8]**

Q2) a) Derive the equation of motion and its solution for free damped vibration system. **[8]**

b) Find the natural frequency and natural period for the building frame shown in the fig. 1. During test the frame is given 40 mm initial lateral displacement and released from the rest to vibrate freely. Find the displacement after 4 seconds and number of cycles when amplitude reduced to 1/20 of maximum.Consider 10% damping. Take $EI_{Column} = 1.5 \times 10^{12}$ N.mm^2, $EI_{Beam} = \infty$. **[10]**

OR

b) A SDOF system consists of 5 m high column of 450 mm diameter which supports the heavy mass of 20 tonne at its top. The system is subjected to a harmonic force of 200 Sin 40t kN. Consider 20% damping & $E = 2.1 \times 10^5$ N/mm^2. Calculate the maximum dynamic amplitude. Also, state whether system will have resonance or not? **[10]**

P.T.O.

Q3) Calculate base shear in the critical direction only for BSNL office in Pune with following data by seismic coefficient method. **[16]**

a) No. of storey = 4

b) No. of bay in x direction = 3

c) No. of bay in y direction = 1

d) storey height = 3 m

e) Width of each bay = 5 m

f) Total DL on roof = 12 kN/m^2

g) Total DL on floor = 10 kN/m^2

h) LL = 4 kN/m^2,

i) Thickness of slab = 120 mm

All columns having their longer side in X direction. Neglect weight of infill walls. Assume suitable data if required. Write all your assumptions & clauses of IS 1893 (2002). Building is provided with additional viscous dampers which will increase damping by 10%.

SECTION - II

Q4) a) Explain ductile detailing of beam as per IS 13920: 1993. Also give limitation of this code. **[10]**

b) Explain four virtue of good earthquake resistant design. **[8]**

OR

b) Explain soft storey & discuss its performance of soft storey building in past earthquakes. How will you avoid soft storey? **[8]**

Q5) a) Define the shear wall and its classification? Describe the structural behavior of shear wall? **[8]**

b) Draw the detailed sketch of **[8]**

i) Different ways of beam jacketing as IS code and.

ii) Different ways of columns as per IS code.

Q6) a) Explain in details concept of Friction Pendulum Bearings? **[8]**

b) Explain Tuned Liquid Dampers with its working principal? **[8]**

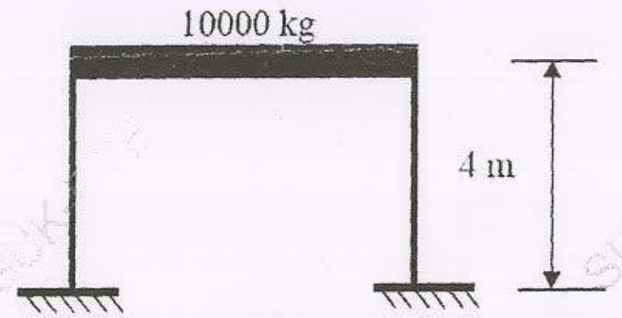


Fig 1.

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
GEOTECHNICAL ENGINEERING - II
Sub. Code: 66874

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Solve any three from following. **[18]**

a) Explain bore hole logging with sketch for soil and rock exploration.

b) List engineering properties of rock. Explain any one with method for determination.

c) Explain elastic settlement of shallow foundation.

d) List types of bearing capacity failure of soil. Explain any one with sketch.

Q2) Solve any two from following. **[16]**

a) Explain standard penetration test for determination of bearing capacity.

b) A plate load test was carried out on a ground having uniform sand strata up to sufficient depth. The size of the plate used was 30cm×30cm. Determine the bearing capacity and load that can be taken by a column foundation of size 1.2 m× 1.2 m in the above strata for an allowable settlement of 2 cm.

Load(kN)	4.5	9	18	27	36	45	54
Settlement (mm)	0.75	1.25	2.0	3.5	5.38	7.75	10.75

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c) Write and explain equation of net ultimate bearing capacity of soil for general shear failure by IS code method with shape, depth, inclination of load and water table factor.

)3) Solve any two from following. **[16]**

a) Explain stepwise procedure for design of strap foundation with required equations and sketch.

b) Design a trapezoidal combined foundation for following data:

Column	Size	Load	Remark
A	0.50×0.50 m	2000kN	Column A is on boundary of plot.C/c distance between columns is 5.0 m.Safe bearing capacity of soil is 200kN/m²
B	0.30×0.30m	1500kN	

c) A rectangular foundation of 6.0 mt × 4.0 mt size carries a uniform load intensity 160kN/sq.m and is located at a depth of 1.5 m in a layer of clay having $E=4\times10^4$kN/sq.m and Poisson's ratio as 0.38. This clay layer underlain by second layer of silty soil having $E=7\times10^4$kN/sq.m and Poisson's ratio as 0.48. A hard strata lies below the second layer. Determine the elastic immediate settlement of the foundation.

SECTION-II

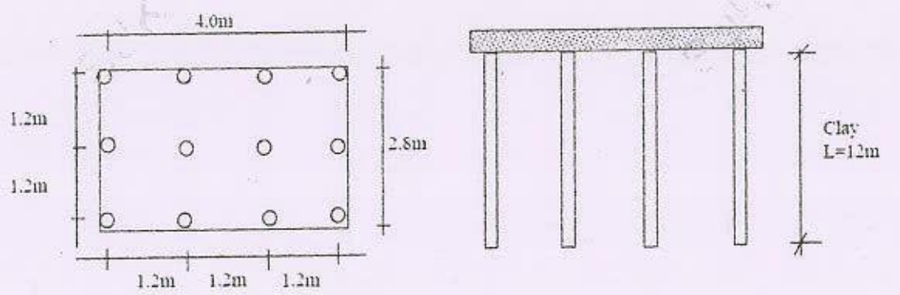
)4) Solve any three from following: **[18]**

a) What is group efficiency of pile group? Explain Feld's rule.

b) Explain with neat sketch under reamed pile and their uses.

c) A rectangular pile of section 0.60 m ×0.75 m and length 12 m penetrates a deposit of clay with c=42 kN/m². Assuming m=0.75, determine the magnitude of negative skin friction.

d) Find the allowable bearing capacity of a single pile in the group of piles given below, by using: Converse-Labarre Formula. Given data:- Diameter: 400mm,Cu=50kPa, $\gamma=18$kN/m³ F.S.=2.5



)5) Solve any two from following: **[16]**

a) Describe the methods of rectifying the tilt in the well during sinking operation.

b) Explain with fig. sand island method.

c) Write the different types and material used for sheet pile.

)6) Solve any two from following: **[16]**

a) Explain the friction circle method of slope stability analysis.

b) Name the techniques used in ground improvement and explain any one.

c) A slope 1 in 2 with a height of 8 m has the following properties of soil are Cu = 28 kN/m², angle of internal friction = 10° and unit weight of soil is 18 kN/m³, Stability Number = 0.064. Calculate factor of safety with respect to cohesion. What will be critical height of the slope in this soil?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
THEORY OF STRUCTURES
Sub. Code: 66873

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**
4) **Assume suitable data if necessary.**

SECTION-I

Q1) a) Explain in brief 'Static Indeterminacy of Structures'. **[5]**

b) Analyze the propped cantilever beam AB of 5m span, fixed at A and propped at B when subjected to a point load of 5kN at 3m from left end A. Take fixed end moment 'M_A' as a redundant. Also draw SFD and BMD. **[12]**

OR

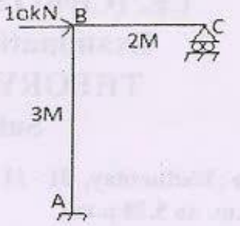
A fixed beam AB 5m in span is subjected to a point load 5kN at 3m from left end A. Analyze the beam by taking 'R_B' and 'M_B' as redundants. Draw SFD and BMD.

Q2) a) Explain 'Unit load Method' to find slope and deflections in structural members. **[5]**

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b) The bent ABC is subjected to lateral load of 10kN as shown in the fig.1 below. Determine the reactions at support C by strain energy method. Draw SFD and BMD **[12]**



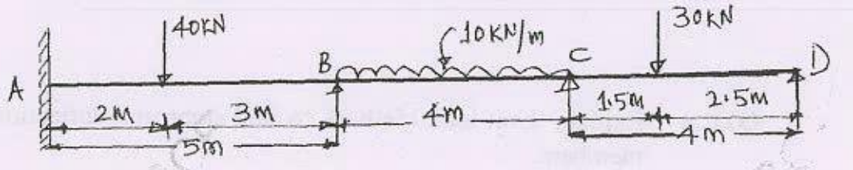
(FIG.1)

)3) A continuous beam ABCD is fixed at A and simply supported at B and C with CD as a overhang wherein AB=4m BC=3m and CD=2m. The span AB is subjected to a udl of 10kN/m throughout, span BC to a point load of 25kN at its midpoint and point D is acted upon by a clockwise couple of 50kNm. During loading support C settles by 5mm. Draw SFD and BMD. Take $EI_{BC} = 2\times10\text{^}4kN/m\text{^}2$. $EI_{AB} = 2EI_{BC}$. **[16]**

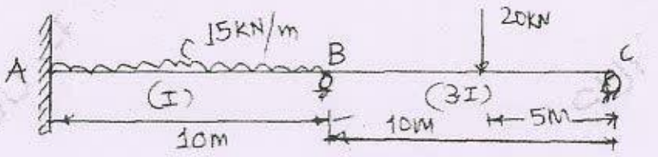
SECTION-II

)4) A two span continuous beam ABC has span AB of 6 m and Span BC of 4 m. End A is fixed while end C of the beam is simply supported. Span AB carries through u.d.l of 20 KN/m and BC carries central point load 40kN.Span AB has its inertia double that of span BC. Analyse the beam using slope deflection method. Draw SFD and BMD. **[17]**

)5) Analysis the continuous beam loaded as shown in fig.by method of moment Distribution method. Sketch the BMD and SFD. **[17]**

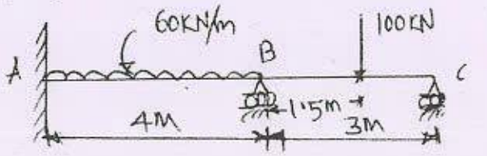


)6) Analysis the two span continuous beam as shown in fig. by stiffness matrix method. Also draw BMD. **[16]**



OR

Analysis the continuous beam as shown in fig.by flexibility matrix method. Take EI constant throughout. **[16]**



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Total No. of Pages :3

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T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

GEOTECHNICAL ENGINEERING - I

Sub. Code: 66238

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instruction :

1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any three of the following. **[18]**

a) Derive the relation for bulk unit weight of soil in terms of Sp. Gravity, water content, void ratio of soil and unit weight of water.

b) List and explain corrections applied to hydrometer reading in wet mechanical analysis.

c) Explain soil structures according to structural composition of sedimented soil.

d) A soil has a dry density of 1.72 gm/cc in the natural condition. When the 840 gm of the dry soil was poured in a container in a loose state its volume was 602 cc. The same soil when vibrated and compacted was found to have volume of 440 cc. Determine relative density of the soil.

Q2) Answer any two of the following. **[16]**

a) Explain Darcy's law and its validity used for permeability of soil.

b) Explain flow net. Derive Laplace equation in two dimensional flow used for flow net construction.

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c) The results of constant head permeability test on soil are follows:-

Internal diameter of permeameter - 7.5 cm.

Head lost over a soil sample length of 18 cm- 24.7 cm

Quantity of water collected in 60 seconds - 626 cc

Porosity of the soil sample - 44%

Determine the coefficient of permeability of soil and also discharge velocity and seepage velocity during the test.

Q3) Answer any two of the following. **[16]**

a) List laboratory methods for determination of compaction factors. Explain any one.

b) Explain fixed ring type consolidometer test for determination of compressibility characteristics of soil with neat sketch.

c) The following are the results of the standard Proctor compaction test.

Mass of mould and compacted soil (gm)	2925	3095	3150	3125	3070
Water content (%)	10.0	12.0	14.3	16.1	18.2

Volume of mould - 1000 cc, Mass of mould - 1000 gm,

Sp. Gravity of soil solids - 2.70

Plot the compaction curve showing OMC and MDD. Determine the degree of saturation at MDD.

SECTION-II

Q4) Answer any three of the following. **[18]**

a) With a neat sketch explain pressure bulb and its significance.

b) Write a note on Newmark's chart.

c) Prove that maximum vertical stress on a plane at a distance 'r' from concerned load Q acting at ground surface will be at a depth $z = 1.225r$.

d) A water tank is supported by a ring foundation having outer diameter of 8 m and inner diameter of 6m. The uniform load intensity on the foundation is 300kN/m^2. Compute the vertical stress caused by the water tank at a depth of 4 m below the center of the foundation.

Q5) Answer any two of the following. **[16]**

a) Explain unconfined compression test procedure with neat sketches.

b) An unconfined cylindrical specimen of clay fails under an axial stress of 240 kN/m^2. The failure plane was inclined at an angle of 55° to the horizontal. Determine the shear strength parameters of the soil.

c) The results of two drained triaxial tests on a saturated clay follows:-

Specimen I :- σ_3=70 kN/m^2 and σ_d=130 kN/m^2

Specimen II :- σ_3= 160 kN/m^2 and σ_d= 223.5 kN/m^2

Determine the shear strength parameters. Solved by analytical method.

Q6) Answer any two of the following. **[16]**

a) Derive an expression for Rankine's active earth pressure due to submerged cohensionless backfill with neat sketch.

b) A cantilever retaining wall of 7 m high retains sand. The properties of the sand are e = 0.5, ϕ=30°, and G = 2.7. Using Rankine's theory determine the active earth pressure at the base when the backfill is

i) dry

ii) saturated and

iii) submerged.

c) A retaining wall 6 m high retains a clay backfill with c= 20 kN/m^2, ϕ=15° and γ= 18 kN/m^3. Assume that the wall is smooth and the back vertical. It is expected that tension cracks may develop to the full theoretical depth. Calculate the total active earth force a acting on the wall.

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Total No. of Pages : 3

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T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

ENVIRONMENTAL ENGINEERING - I

Sub. Code :66237

Day and Date : Tuesday, 14- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Assume and mention data if necessary.**

Q1) Answer Any Three of following. **[3 × 6 = 18]**

a) Explain the basis on which the water source is selected for water supply.

b) 'Water should be necessarily treated before municipal supply.' Explain.

c) State details of intake well from its place and importance point of view.

d) Explain design steps for intake well.

e) Write a note on Population Forecasting.

Q2) a) Design a cascade aerator for 10 MLD flow. **[8]**

b) Explain the concept of destabilization of colloidal particles during coagulation. **[4]**

c) Explain the concept of tube & plate settler. **[4]**

Q3) a) What is demineralization? Explain any one process in detail. **[6]**

b) Explain detailed operation of filtration process in rapid sand filter with diagram. **[6]**

OR

b) Explain water softening process. Explain any one in detail. **[6]**

c) Explain forms of chlorination. **[4]**

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SECTION - II

Q4) Answer any three of following. **[3 × 6 = 18]**

a) Explain details of steel pipes with respect to strength, durability, leakage, laying, transportation, availability and advantages.

b) Mention necessity and types of reservoirs in detail.

c) Write a note on

i) Pumping mains

ii) Gravity mains

d) Explain the pressure testing process in detail.

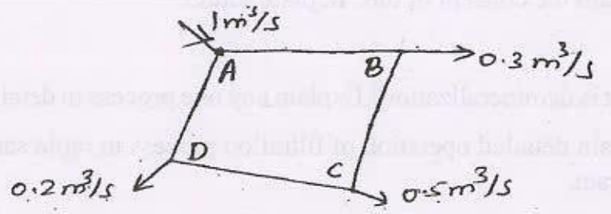
e) Explain factors considered for choice of pipe materials.

Q5) a) What are the various layout patterns of water distribution system? **[5]**

b) A pipe network consist of following pipes- **[8]**

Pipe	Length(m)	Dia(mm)	Friction factor
AB	400	300	0.014
BC	600	300	0.010
AD	500	400	0.012
DC	500	250	0.011

Inflow at A is 1 m3/s, while outflow at B,C and D are 0.3, 0.5 and 0.2 m3/s respectively. Find flow in pipes.



c) "Software plays a vital role in network analysis." Explain. **[3]**

Q6) a) Explain fire hydrants and water meter in detail. **[6]**

b) Explain the maintenance of water distribution system. **[6]**

OR

b) Write a note on green building materials. **[6]**

c) What is water budgeting? **[4]**

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester - V) Examination, November - 2017

DESIGN OF STEEL STRUCTURES (New)

Sub. Code : 66236

Day and Date : Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions Compulsory.**
2) **Use of IS 800:2007, IS 875, Steel table, Non programmable calculator permitted.**
3) **Figure to the right indicate full marks.**
4) **Draw sketches wherever necessary.**
5) **Assume suitable data if required.**

SECTION - I

Q1) a) What is serviceability Limit state? Explain. **[4]**

b) Write note on "High Strength Friction Grip (HSFG) bolts." **[4]**

c) A tension member is subjected to force of 150 KN. The member consists of a plate 75mm × 8mm in size is connected to 10mm thick gusset plate. The grade of steel is Fe 410. Design fillet weld if (a) Weld is provided on two sides of plate in direction of force. (b) Weld is provided on three sides of plate. **[8]**

Q2) a) Explain in brief with sketches the modes of failure of tension members. **[6]**

b) A tension member of a truss consist of two angles 75×50×6 which are provided on either side of a 10mm thick gusset plate. 20mm dia. Bolts are used in one row for connecting the member to the gusset plate. Determine design tensile strength of the member and also the number of bolts required to develop the design tensile strength. **[12]**

OR

b) Design an angle section to carry a factored tensile force of 200 kN. Bolts of 20mm diameter are to be provided for the connection of the member to the gusset plate. Take fy = 250Mpa and fu = 410 Mpa. **[12]**

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23) a) Explain the terms with reference to compression members, (i) Effective length of struts, (ii) Slenderness ratio. **[4]**

b) Two angles 90×60×8 are used as strut 3m long and connected to 10mm thick gusset plate at each end. Determine the design strength of the strut for the following cases. **[12]**

i) When the longer leg of the angle are connected on either side of gusset plate.

ii) When the longer leg of the angle are connected to same side of gusset plate

SECTION - II

24) a) Why lacing is provided for column? How much load is taken by lacing. **[4]**

b) Design a 8m long built up column to carry a factored axial load of 1250 KN . The column is restrained in position but not direction at each end. The column shall consist of two channels placed toe to toe at a suitable spacing. **[12]**

OR

b) An ISHB400 @759.3 N/m column carries a factored axial load of 2000 KN. Design a slab base for the column. Assume that the bearing surfaces of the column and base plate are machined. The concrete footing is of M20 grade. **[12]**

25) a) What is web buckling and web crippling? How the beam checked against web bucking and crippling? **[6]**

b) A 150mm thick slab is supported on steel beams of effective span 5.25m which are spaced at 3.25m c/c. Allow live load of 3.50 kN/m^2 and a 40mm floor finish at 20 kN/m^3.Design the beam and check it for shear. **[12]**

26) a) Draw neat sketch of (i) crane gantry girder assembly (ii) the typical cross sections for gantry girder. **[4]**

b) The Crane system has the following data. Determine the design forces acting on it. **[12]**

- Crane capacity = 100kN
- Weight of crane girder = 90kN
- Weight of crab,motor,hook = 20kN
- Minimum hook Approach = 1.1 m
- Wheel base = 2.5 m
- Span of gantry girder = 5.5 m
- Weight of gantry girder = 8 kN
- c/c spacing of crane rails = 20 m

The crane is electrically operated.

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester-V) (Revised) Examination, November - 2017

WATER RESOURCES ENGINEERING - I

Sub. Code : 66235

Day and Date : Thursday, 09-11-2017 **Total Marks : 100**

Time : 10.0 a.m. to 1.00 p.m.

Instructions :
1) **Que. 1 and 5 are Compulsory. Attempt any two questions from remaining questions from both sections.**
2) **Assume any suitable data if necessary, wherever needed.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain infiltration capacity of the soil with help of a graph. Explain the effects of infiltration. **[6]**

b) Describe the procedure to construct unit hydrograph from storm hydrograph. **[6]**

c) Explain how discharge of the water stream is measured? Explain any one method in detail. **[6]**

Q2) a) Exnlist different methods of assessment of average precipitation. Explain any one method in detail with a neat sketch. **[8]**

b) Define evaporation process. Describe the factors affecting evaporation and also the measures to reduce it. **[8]**

Q3) a) Define unit hydrograph. List the assumptions and limitations involved in unit hydrograph theory. **[8]**

b) Given below are the ordinates of 4 hour unit hydrograph. Derive and plot 16 hour unit hydrograph. Describe the procedure in detail. **[8]**

Time(hours)	0	4	8	12	16	20	24	28	32	36	40
Observed flow(m^3)	0	16	58	89	145	80	55	36	16	8	0

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Q4) Write detailed notes on: **[16]**

a) Abstract losses from precipitation

b) Factors affecting runoff

c) Site selection criteria for discharge measurement of river.

d) Flood frequency analysis

SECTION-II

Q5) a) Define porosity, specific yield and specific retention and obtain relation between them. **[6]**

b) The base period, intensity of irrigation and duty of water for various crops under a canal system are given below. Determine the reservoir capacity if culturable commanded area is 40000 hectors, canal losses are 20% and reservoir losses are 10%. **[6]**

Crop	Base period (Days)	Duty of water at the field (Hectors/ cumec)	Intensity of irrigation (Percentage)
Cotton	180	1400	10
Sugar cane	360	1700	20
Wheat	120	1800	20
Rice	120	800	15
Vegetables	120	700	15

c) Explain Bandhara irrigation scheme in detail. **[6]**

Q6) a) Derive an expression for discharge from a well in unconfined aquifer the well fully penetrates it. **[8]**

b) Briefly explain role of ground water in water resources development of country. **[8]**

Q7) a) Explain in detail following: **[6]**

i) Intensity of irrigation

ii) Kor watering

iii) Kor depth

iv) Kor period

v) Crop ratio

vi) Overlap allowance

b) Explain estimation of evapo-transpiration by penman method. **[5]**

c) Discuss in brief water logging and land drainage. **[5]**

Q8) a) Explain need and importance of water shed management. **[8]**

b) Explain with neat sketch the layout, main components and working of percolation tanks also explain its advantages and disadvantages. **[8]**

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Part - III) (Semester - V) (Revised) Examination, November - 2017

TRANSPORTATION ENGINEERING - I

Sub. Code : 66239

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Explain the classification of roads according to Lucknow Road Plan. **[8]**

b) Explain the factors controlling the highway alignment. **[8]**

OR

b) What do you understand by 'Stopping Sight Distance'? State the factors affecting Stopping Sight Distance. Calculate the SSD on a level road for design speed of 60 kmph for two-way traffic on a single lane road. Assume coefficient of friction 0.36 and reaction time of driver as 2.5 Seconds. **[9]**

Q2) a) What is the significance of 'Penetration Test on Bitumen'? Explain the procedure in detail. **[8]**

b) Explain functions of the components of a flexible pavement with sketch. **[8]**

OR

b) Explain 'CBR Test'. How the pavement thickness is determined by CBR method? **[9]**

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Q3) a) What are the objects of conducting 'Traffic Volume Study'? Explain the methods of Traffic Volume Study. [8]

b) Explain the steps of construction of Cement Concrete Pavements. [8]

OR

b) State the necessity and methods of Highway Drainage. [8]

SECTION - II

Q4) a) Explain movement of aeroplane about three axes with a neat sketch. [8]

b) Explain with sketches, [8]

i) Fillets,

ii) Holding Apron

OR

b) Determine the length of runway required for following data, [9]

Basic runway length under standard conditions = 1200m

Site elevation above M.S.L. = 900 m

Aerodrome reference temperature = 16°C

Effective gradient = 0.5%

Q5) a) Explain with sketches, [8]

i) Wave action on a sea wall

ii) Littoral Drift

b) Explain Dry Docks and Wet Docks. [8]

OR

b) Explain the requirements of a harbour. State the factors to be considered while selecting a harbour. [8]

Q6) a) Explain: [8]

i) Lighting in tunnels;

ii) Ventilation in tunnels

b) Explain 'Shield Method' of tunneling in soft ground with sketch. [8]

OR

b) Explain the operations in sequence in one cycle of tunneling in hard rock. [9]

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Total No. of Pages : 3

Seat No.	

T.E. (Civil Engg.) (Part - II) (Semester - VI) (Revised) Examination, November - 2017
ENGINEERING MANAGEMENT
Sub. Code: 66875

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) a) Enumerate principles of management given by Henry fayol and explain any three of them? **[8]**

OR

a) With suitable example explain decision tree? **[8]**

b) Four salesman are to be assigned to four district Estimates of sales revenue in thousands of rupees for each salesman is given below.

Assign salesman to the district. **[10]**

Salesman	District			
	A	B	C	D
01	32	35	40	28
02	40	25	30	22
03	42	27	34	30
04	25	39	41	35

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Q2) a) Enumerate types of organization? With neat organization structure diagram explain any one along with its advantages and disadvantages? **[8]**

OR

a) Define planning? Explain process and characteristic of planning? **[8]**

b) Calculate total cost of inventory & EOQ from following annual consumption of 36000 units, inventory carrying cost is 20%per annum with ordering cost 25 RS associated with one order & cost per item is 1 Rs? **[8]**

Q3) Write any two **[16]**

a) Derive derivation for EOQ formula.

b) State and describe importance of management in construction industry.

c) Explain ABC analysis concept with neat graph?

SECTION - II

Q4) a) Suggest which equipment should be purchased if rate of interest is 12% per year by using present worth method.

	Equipment A	Equipment B
Initial Cost (Rs)	Rs 25000/-	Rs 35000/-
Annual O & M cost (Rs)	Rs 9000/-	Rs 7000/-
Salvage value (Rs)	Rs 2000/-	Rs 3500/-
Life (in Years)	5	5

[12]

b) With suitable example explain the term equivalence. **[6]**

OR

b) With suitable example explain the term time value of money. **[6]**

Q5) a) Draw a typical layout for site of construction of multistoried building. **[5]**

OR

a) What do you know about child labour act? **[5]**

b) What are the factors considered for site layout? **[5]**

c) Write a detailed note on building and other construction workers act. **[6]**

Q6) Write Any 2 **[16]**

a) Write down procedure for value analysis?

b) Draw quality circle organization structure and explain benefits of quality circle?

c) With neat flow chart describe the procedure of work study?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (New) Examination, November - 2017

ENGINEERING GEOLOGY

Sub. Code: 66876

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Answer to the two sections must be written in one and same answer book.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) Attempt any two of the following:

a) Describe with neat sketches depositional features formed by river. **[9]**

b) What is meant by Igneous Rock? Give the classification of Igneous Rocks on the basis of mode of occurrence. Mention one rock from each group. **[9]**

c) What are the parameters of fault? Explain the causes of faulting. **[9]**

Q2) Attempt any two of the following:

a) Explain in brief various process of weathering. **[8]**

b) What is metamorphism? Describe in detial the agents of metamorphism. **[8]**

c) Describe with the help of neat sketches the part of folds. Give in brief the Civil Engineering significance of fold. **[8]**

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Q3) Write short notes on: [16]

a) Interior of the Earth.

b) Grain size classification of Sedimentary Rocks.

c) Types of unconformity.

d) Scope of Engineering Geology.

SECTION-II

Q4) Attempt any two of the following:

a) Explain the various causes of earthquake. Write a brief note on RIS. [9]

b) Describe the internal causes of landslides. [9]

c) With a suitable sketch explain the zones of groundwater. [9]

Q5) Attempt any two of the following:

a) Explain the various steps in the preliminary geological investigation at a civil engineering site. [8]

b) Data obtained from a drill hole at foundation site is as follows. [8]

i) Top of borehole- R.L.410 m.

ii) Bottom of borehole- R.L. 380 m.

iii) Length of each piece of core obtained between 400m and 397m is, 16, 11, 13, 09, 08, 21, 23, 06, 05, 09, 08, 14, 19, 23, 21, 16, 18, 07, 06, 07, 10

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Find,

1) Total length of core recovered

2) Core Recovery

3) Core loss

4) RQD

c) Explain the suitable and unsuitable conditions for excavating a tunnel. **[8]**

Q6) Write short notes on the following: **[16]**

a) Dams on Deccan Trap.

b) Overbreak.

c) Observations during drilling.

d) Confined aquifer.

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Total No. of Pages : 3

Seat No.

S.E. (Civil) (Part - II) (Semester-IV) Examination, November - 2017
FLUID MECHANICS - II
Sub. Code : 63347

Day and Date : Monday, 06-11-2017 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) Question no. 1 and 5 are compulsory.
2) Attempt any other two questions from each section.
3) Assume any suitable data if necessary.
4) Figures to the right indicate full marks.

SECTION-I

Q1) a) Design an efficient trapezoidal channel of side slope2H:1V bed slope 1 in 4900 to carry a discharge of $8m^3/sec$. Take Manning's n=0.025. [5]

b) Define - Most economical channel section. Derive the formula for most efficient triangular section. [5]

c) Derive an expression for the loss of energy due to hydraulic jump in a rectangular channel is in the form of [5]

$$\Delta E = \frac{(Y_2 - Y_1)^3}{4 Y_1 Y_2}$$

d) Compare Gradually Varied flow and Rapidly Varied Flow? [5]

Q2) a) Draw the following [5]
i) Specific energy curve.
ii) Specific force curve.
iii) Discharge diagram.

b) A 3m wide rectangular channel carries a discharge of $1.85m^3/sec$ at a depth of 0.5m. Find the greatest allowable contraction in the width to get critical flow at the contracted section. [5]

c) Derive Chezy's formula for uniform flow in an open channel. [5]

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Q3) a) Derive the expression

$$(dy/dx)=\frac{So-Sf}{1-Fr^2}$$

Where (dy/dx) =Water surface slope

So = channel bottom slope

Sf = Energy line

Fr = Froude Number **[5]**

b) Discuss the relation between water surface slope and channel bottom slope. **[5]**

c) Write a note on M_1 and M_3 curve. **[5]**

Q4) a) Derive the expression for hydraulic jump

$$\frac{Y_2}{Y_1}=\frac{1}{2}\left\{-1+\left(1+8\left(Y_c/Y_1\right)^3\right)^{1/2}\right\}$$

Where Y_1 = depth of water before jump

Y_2 = depth of water after jump

Y_c = critical depth. **[5]**

b) A rectangular channel 7.5m wide has a uniform depth of flow of 2.0m and has a bed slope of 1 in 3000. If due to weir constructed at the down stream end of the channel, water surface at a section is raised by 0.75m. Determine the water surface slope with respect to horizontal at this section. Assume Manning's n = 0.02. **[5]**

c) A rectangular channel carries a discharge of $2m^3$/sec per meter width. If the loss of energy in the hydraulic jump is found to be 2.75m, determine the conjugate depths before and after the jump. **[5]**

SECTION-II

Q5) a) Discuss the advantages of Triangular weir over Rectangular weir. **[5]**

b) Write a note on ventilation of weir. **[5]**

c) What are advantages of hydro-electric power plant. **[5]**

d) What are the different efficiencies of a centrifugal pump. **[5]**

Q6) a) Derive an expression for the force exerted by the jet at centre on a stationary curved plate. **[5]**

b) A 50mm diameter jet having a velocity of 25m/sec strikes a flat plate the normal of which is inclined at 30° to the axis of the jet. Calculate the normal force exerted on the plate. **[5]**

i) When the plate is stationary.

ii) When the plate is moving with a velocity of 10m/sec in the direction of the jet.

c) In an experiment on a 90°V notch, the flow is collected in a rectangular tank having the cross section 0.8×0.8m.If the water level in the collecting tank changed from 0.7m to 1.4m in 17.2 seconds when the head over the notch was 0.2m, estimate the coefficient of discharge for the notch. **[5]**

Q7) a) Write short note on NPSH- centrifugal pump. **[5]**

b) Define Static head, Manometric head, Delivery head, Gross head and suction head. **[5]**

c) Write short note on common pump troubles. **[5]**

Q8) a) What is hydraulic turbine? How are they classified? **[5]**

b) What are disadvantages of hydroelectric power generation? **[5]**

c) Draw the figure of Francis turbine. **[5]**

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Total No. of Pages : 3

Seat No.	

S.E. (Civil Engineering) (Semester-IV) (New) Examination, November - 2017
CONCRETE TECHNOLOGY
Sub. Code :63346

Day and Date : Friday, 03- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) a) Describe effect of impurities in water on properties of concrete. **[8]**

b) Describe the procedure for determining standard consistency of cement. **[8]**

Q2) a) Define placing of concrete and describe the different method of placing of concrete. **[8]**

b) Compare slump test and compacting factor test for determining the workability of concrete. **[8]**

OR

b) What do you mean by mineral admixture? Explain in detail silica fume and GGBS? **[8]**

Q3) a) Enlist different tests for hardened concrete. Explain Split cylinder test. **[9]**

b) What is creep and shrinkage of concrete? List the factors affecting creep and shrinkage of concrete. **[9]**

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SECTION - II

Q4) Write short notes (any three) **[18]**

a) Ferrocement

b) No-fines concrete

c) Vacuum Dewatered Concrete

d) Roller Compacted Concrete

Q5) a) What is durability of concrete? Enlist factors affecting durability of concrete. Explain any one in detail. **[8]**

b) What is permeability of concrete? Enlist factors affecting permeability of concrete. Explain any one in detail. **[8]**

OR

b) List various Non-Destructive tests for assessment of strength of concrete. Explain Rebound Hammer test. **[8]**

Q6) Define the "Mix design" and design concrete mix M20 using following data and IS: 10262 procedures. **[16]**

a) Max. size of aggregate - 20 mm

b) Degree of workability = 0.80 CF

c) Degree of quality control = good

d) Type of exposure = mild

e) w/c = 0.47

f) Cement used = OPC 53 grade

g) Sp. Gravity of cement = 3.15, Coarse aggregate = 2.85, Fine aggregate = 2.65

h) Water absorption of Coarse aggregate = 0.5%, Fine aggregate = 1.0%

i) Free moisture in C.A. =0.0%, F.A. = 0.0%

j) Bulk density of Cement = 1440, C.A. = 1650, F.A. = 1800 kg/m^3

Take standard deviation: 5 and Tolerance factor: 1.65

Table No. 2 Maximum Water Content per Cubic Meter of Concrete for Nominal Maximum Size of Aggregate

Sr.No.	Nominal Maximum Size of Aggregate	Maximum Water Content kg/m^3
1	10	208
2	20	189
3	40	165

Table No. 3 volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate

Sr.No.	Nominal Size of Aggregate	Zone IV	Zone III	Zone II	Zone I
1	10	0.50	0.48	0.46	0.44
2	20	0.66	0.64	0.62	0.60
3	40	0.75	0.73	0.71	0.69

Sl. No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Contents kg/m^3	Maximum Free W/C ratio	Minimum Grade of concrete	Minimum Cement Content kg/m^3	Maximum Free W/C ratio	Minimum Grade of Concrete
1.	Mild	220	0.60	-	300	0.55	M 20
2.	Moderate	240	0.60	M 15	300	0.50	M 25
3.	Severe	250	0.50	M 20	320	0.45	M 30
4.	Very Severe	260	0.45	M 20	340	0.45	M 35
5.	Extreme	280	0.40	M 25	360	0.40	M 40

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Total No. of Pages :3

Seat No.	

S.E. (Civil) (Semester - IV) (Revised) Examination, November - 2017
SURVEYING - II
Sub. Code: 63345

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Answer any THREE questions from Each section.**
2) **Figures to the RIGHT indicate FULL marks**
3) **Assume suitable data if NECESSARY and state them clearly.**
4) **Answers shall be supported by adequate sketches.**

SECTION-I

Q1) Attempt any three questions.

a) Explain the theory of Stadia tacheometry in detail. **[7]**

b) To find the RL of station C two observations are taken by a theodolite from station A. One to a BM and the other to the station C. The record as follows.

Inst. station	Staff station	Target	Vertical angle	Staff Reading	Remark
A	BM	Lower Upper	–12°30' –8°20'	0.565 2.565	RL of BM=755.5m
A	C	Lower Upper	–7°30' +3°12'	1.25 3.2	

Find RL of C and the distance between the BM and station C. BM and stations A,C are collinear. **[10]**

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Q2) a) What are the factor consider for selection of base line? [4]

b) Explain the principle of EDM. [4]

c) Two triangulation stations A and B 60 km apart and have elevations 240 m and 280m respectively. Find minimum height of signal required at B so that line of sight may not pass near the ground than 2 meters. The intervening ground may be assumed to have uniform elevation of 200m. [9]

Q3) Write a short note any four. [16]

a) Tacheometric contouring

b) Total station

c) Trilateration

d) Reconnaissance in triangulation

e) Triangulation figures.

Q4) a) What is spherical triangle? Discuss its properties. [5]

b) Define the following terms.

i) Rational horizon

ii) Prime vertical

iii) Visible horizon [6]

c) Explain the significance of Polaris in field astronomy. [5]

SECTION-II

Q5) a) Derive an expression for calculating ordinates from long chord. [5]

b) Find out the necessary data for setting out a simple circular horizontal curve by the method of offsets from chords produced. Take peg interval as 20m., angle of intersection as 144°, radius of curve as 300m., chainage at point of intersection as 1390 m. [9]

c) What are the functions of a Transition curve. [3]

Q6) a) Draw a neat line diagram of mirror stereoscope and also explain the principle on which it works. [6]

b) Calculate the maximum number of photographs required to cover a fairly level area with the following data. Scale of photography is 1:10,000, Area is 100Sq.Km, Longitudinal overlap is 60% , Side lap is 30%, Size of photographs is 20 cm. × 20 cm. [6]

c) Discuss the uses of Photogrammetry. [5]

Q7) a) Explain Electromagnetic energy and its interaction with matter. [8]

b) Describe in brief the segments of GPS. [5]

c) What are the advantages of GIS. [3]

Q8) Write short notes on. [16]

a) Vertical curves

b) Reverse curves

c) Fiducial marks and fiducial axes

d) Atmospheric windows.

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Total No. of Pages : 3

Seat No.	

S.E. (Civil) (Semester - IV) (Revised) Examination, November - 2017

STRUCTURAL MECHANICS

Sub. Code : 63344

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of electronic calculator is permitted.**
4) **Assume suitable data if necessary and mention it clearly.**

SECTION - I

Q1) a) Derive the for normal and tangential stresses on a plane making angle θ with σ_x direction. **[6]**

b) A thin cylinder with 1000 mm dia. and 20 mm wall thickness is subjected to internal pressure of 2 MPa. In addition the cylinder is subjected to shear stress of 30 MPa. Calculate the principal stresses and their orientation. **[10]**

Q2) a) Derive the limiting value of eccentricity on rectangular section for no tension condition and show the kern of the section. **[6]**

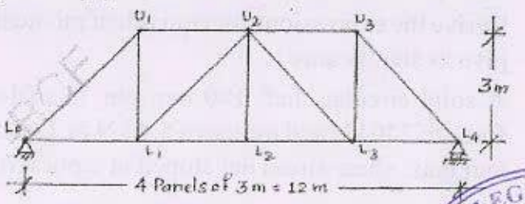
OR

Discuss different modes of failure of gravity dam and their significance in analysis of dam.

b) A trapezoidal masonry dam 4 m high is 1 m wide at top and 3 m wide at base retains water against vertical face. Determine max. and min. intensities of pressure. Unit weight of masonry = 20 kN/cum. **[10]**

Q3) Attempt any two : **[2 × 9 = 18]**

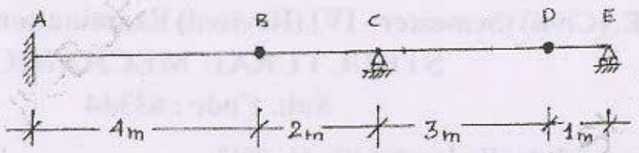
a) Construct the influence line diagrams for force in members U_1U_2, L_1L_2, L_2U_3 and U_1L_1 of the through truss shown in fig. 1



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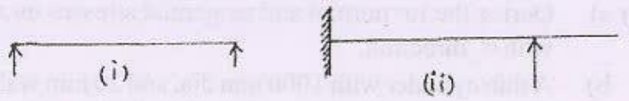
b) Construct the influence line diagrams for reaction at A and moment at A of the compound beam shown in fig. 2.



c) Using the I.L.D.s of Q.3 (b) find the values R_A and M_A when load of 100 kN acts at D.

SECTION - II

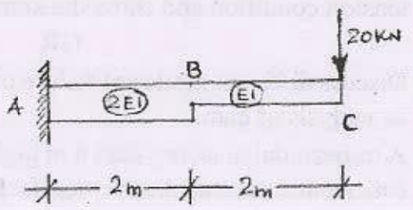
Q4) a) State the conjugate beam theorems with neat diagrams and draw the conjugate beams for the beams shown in the fig.3. **[6]**



OR

Using double integration method find the central deflection of the simply supported beam subjected to u.d.l. on entire span.

b) Find the slope and deflection at end C of the beam shown in fig. 4. **[10]**



Q5) Attempt any two : **[2 × 9 = 18]**

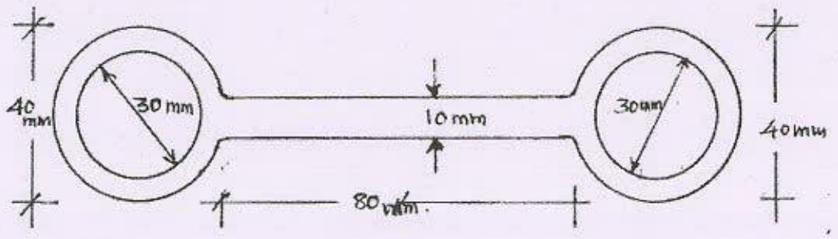
a) The maximum allowable shear stress in a hollow shaft whose outer dia. is twice the inner dia. is 80 MPa. Determine the diameter of the shaft if it is subjected to torque of 4 kN.m. and bending moment of 3kN.m.

b) Derive the expressions for equivalent moment and equivalent torque and give its significance.

c) A solid circular shaft 100 mm dia. is subjected to axial compressive force of 240 kN and torque of 5.4 kN.m. Determine the principal stresses and max. shear stress developed at a point on the surface of the shaft.

Q6) a) State the assumptions and limitations of the Euler's formula. **[5]**

b) The member of a frame of machine acts as strut with both ends fixed. The cross section of the member is formed of two tubes and a plate welded as shown in fig.5. The length of the member is 1.5 m. Taking factor of safety = 6 find the maximum load the member can resist. Take $f_y = 320$ N/mm², $\alpha = 1/7500$. **[11]**



Q8) Write short notes on any three of following: [18]

a) Concept of HGL and TEL with illustrative sketches.

b) Use of Moody's chart.

c) Boundary layer: concept, separation and control.

d) Water hammer and surge tank.

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Total No. of Pages :4

Seat No.

S.E. (Civil) (Semester - III) Examination, November - 2017
FLUID MECHANICS - I
Sub. Code: 63341

Day and Date :Tuesday, 21 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions : 1) Attempt any three questions from each section.
2) Figures to the right indicate full marks.

SECTION - I

Q1) a) Define and explain significance of following fluid properties with their SI units. [8]

i) Viscosity.

ii) Bulk modulus of elasticity.

iii) Vapor pressure.

iv) Surface tension and Capillarity.

Give practical examples.

b) Find the form of equation for discharge Q through a sharped edged triangular notch, which depends on central angle α of notch, head H , acceleration due to gravity g , density ρ, viscosity μ and surface tension σ. Use Buckingham π theorem of dimensional analysis. [8]

Q2) a) Explain how to calculate total pressure acting on a curved surface immersed in liquid. [4]

b) Find total pressure acting on unit length of a dam with vertical upstream face for a depth of water 50 m out of which bottom 10m is silt of specific gravity 1.2. Draw a sketch to show pressure diagram. [6]

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c) A wooden cylinder of circular section and uniform density, specific gravity 0.6 is required to float in oil of specific gravity 0.8. If the diameter of the circular is d and its length is '1' can not exceed about 0.817d for cylinder to float with its longitudinal axis vertical. **[6]**

Q3) a) What is flownet? What are methods of drawing flownet? Give the uses of flownet and its limitations. **[6]**

b) Define stream function and velocity potential function.

The velocity components in a 2 dimensional flow field for an incompressible fluid are expressed as **[6]**

$$u = y^3/3 + 2x - x^2y$$

$$v = xy^2 - 2y - x^3/3$$

Obtain an expression for stream function ψ

c) Two velocity components are given in the following case, find the third component such that they satisfy the continuity equation. **[4]**

$$u = x^3 + y^2 + 2y^2$$

$$v = -x^2y - yz - xy$$

Q4) Write short note on any three of following : **[18]**

a) Dimensionless numbers and their significance in model studies.

b) Stability of submerged and floating bodies.

c) Types of flow in pipe with practical examples.

d) Pressure measurement devices.

SECTION - II

Q5) a) Derive Euler's equation of motion along a stream line and further derive Bernoulli's theorem. What are the limitations. **[8]**

b) A venturimeter is to be fitted in a pipe of 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is 8.1 m^3/min. Find the least diameter of throat to ensure that the pressure head does not become negative. Take Cd = 0.96 **[4]**

c) Derive the expression for time required to empty the tank through an orifice. **[4]**

Q6) a) Explain Reynold's experiment. **[6]**

b) Oil of viscosity 0.1 Pa.s and specific gravity 0.90, flows through a horizontal pipe of 25 mm diameter. If the pressure drop per meter length of the is 12 KPa. Determine,

i) The rate of flow in N/min.

ii) The shear stress at the pipe wall.

iii) The Reynold's number of the flow

iv) The power required per 50 m length of pipe to maintain the flow. **[6]**

c) What do you mean by hydraulically smooth and rough boundaries. **[4]**

Q7) a) What are the different losses in pipe flow? Derive expression for each loss. **[8]**

b) A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2 m length of pipe was replaced by 75 mm diameter pipe, the change of section being sudden? Take f = 0.04 for the pipes of both diameter. **[8]**

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Seat No.	

Total No. of Pages : 3

SE (Civil) (Part - II) (Semester - III) Examination, November - 2017

STRENGTH OF MATERIALS - I (Revised)

Sub. Code : 63340

Day and Date :Wednesday, 15 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non - programmable calculator is allowed.**
4) **Assume any suitable data if required and state it clearly.**

SECTION - I

Q1) a) Explain with neat diagram, Stress-Strain Curve of mild steel rod under axial tensile force. **[4]**

b) The rod ***ABC*** is made of an aluminum for which E = 70 GPa as shown in Fig. 1. Knowing that ***P*** = 6 kN up at point ***A*** and ***Q*** = 42 kN down at point B, determine the deflections at point A and point ***B***.***AB*** = 0.4 m and 20 mm dia, ***BC***= 0.5 m and 60 mm dia. **[13]**

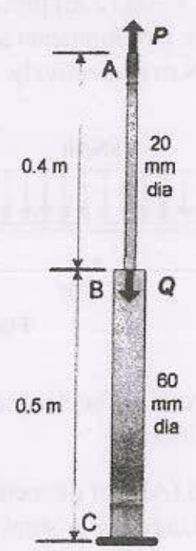


Fig. 1

OR

a) Explain Saint-Venant's principle with neat diagrams. **[4]**

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b) At room temperature (21° C) a 0.5 mm gap exists between the ends of aluminum and steel rods of lengths 300 mm and 250 mm respectively as shown in Fig. 2. When temperature is reached 160°C, determine normal stress in aluminum bar and change in length of aluminum bar. **[13]**

Aluminum rod: Area = 1806 sq.mm, E_A= 72 GPa, α_A = 23.9 x 10^{-60}/C.
Steel rod: Area = 774 sq.mm, Es= 190 GPa, α_s = 17.3 x 10^{-60}/C

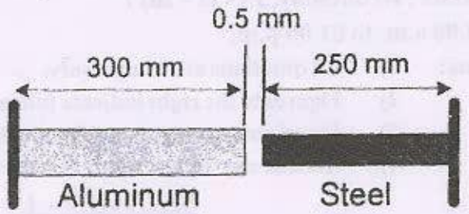


Fig. 2

22) a) Explain with neat diagrams, relationship between load, shear force and bending moment. **[4]**

b) Draw Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for a cantilever beam ABC of length 3 m, fixed at A and free at C as shown in Fig. 3. AB (2 m) portion is loaded with uniformly distributed load of I kN/m, two moments are applied at B and C with magnitude 2 kN.m and 3 kN.m respectively. **[13]**

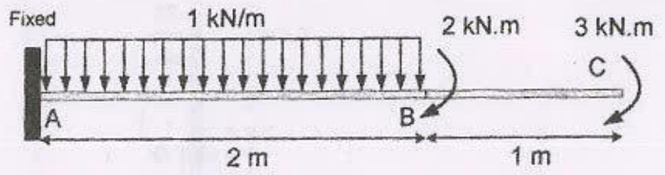


Fig. 3

23) a) Derive an expression for circumferential stress and longitudinal stress in thin walled cylinders. **[4]**

b) Two rods, steel (AB) of diameter 38 mm and brass (BC) of diameter 46 mm connected together as shown in Fig. 4. If allowable shear stresses in steel and brass rods are 104 MPa and 55 MPa, find largest torque T applied atA. **[12]**

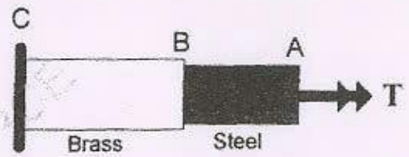


Fig. 4

SECTION - II

24) a) A beam 80 mm × 120 mm is 4 m long simply supported at its ends. The beam supports a central load W at the center of span of beam. If the maximum bending stress is limited to 4000 N/sq.cm. Find the value of W when. **[9]**

i) Smaller dimension is used as depth

ii) Greater dimension is used as depth.

b) A cantilever beam of span 3 m carries uniformly distributed load of 2 kN/m. If the beam is of rectangular cross section, whose depth is twice the width of section, find width and depth of the beam. Allowable bending stress is 14000 N/sq.cm. **[8]**

25) a) Draw shear stress distribution diagrams for I and T sections with maximum and average values. **[4]**

b) T sectional steel beam having flange of 100 mm × 20 mm and web 10 mm × 150 mm. Draw shear stress distribution across the depth of the section. If the beam is simply supported over a span of 5 m subjected to uniformly distributed load of 40 kN/m over entire span. **[13]**

26) A weight of 25 kN falls through 40 mm on a collar rigidly attached to the lower end of vertical steel bar of length 3.5 m and having area of 6.5 cm^2. What is the instantaneous maximum stress and corresponding instantaneous maximum strain of the bar. Take E_s = 200 GPa **[16]**

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Total No. of Pages : 3

Seat No.	

S.E. (Civil) (Semester - III)
Examination, November - 2017
SURVEYING - I
Sub. Code : 63339

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Answer any THREE questions from EACH section.**
2) **Figures to the RIGHT indicate FULL marks.**
3) **Assume suitable data if NECESSARY and state them clearly.**
4) **Answers shall be supported by adequate sketches.**

SECTION - I

Q1) Solve (6 marks each) **[18]**

a) Explain test and adjustment for setting the bubble axis parallel to line of collimation for dumpy level.

b) Explain auto level with diagram of tilt compensator.

c) Derive expression for correction for curvature and refraction.

Q2) a) State and explain significance of temporary and permanent adjustments for a Level. **[8]**

b) While carrying out two peg test following data are collected for a level **[8]**

Distance AB= 100 m

Instrument at C, 50 m i.e. midway between A&B

Reading at A = 2.5 m reading at B = 3.5 m

Instrument at D in line AB 25 m from B such that AD= 125 m

Reading at A= 2.0 m reading at B = 3.25 m

If the instrument is to be adjusted what procedure will you follow?

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)3) a) The perpendicular offsets taken at 10m interval from a survey line to an irregular boundary are 2.25,3.85 ,4.5 ,6.8,5.2 ,7.35 ,8.9,8.3, & 5.45 m. determine the enclosed area by **[8]**

i) Average ordinate rule

ii) Trapezoidal rule

iii) Simpson's rule.

b) Define area of zero circle and methods for calculating area of zero circle. Explain any one method in detail. **[8]**

)4) Writes short notes on **[16]**

a) Resectioning in plane table survey.

b) Plane table and its accessories.

c) Block contouring.

d) Factors affecting sensitivity of level tube.

SECTION - II

)5) a) What is the purpose of **[16]**

i) Making face left and face right observations.

ii) Observing the readings on both the verniers.

iii) Repetition method of horizontal angle measurement.

b) Explain stepwise procedure of measuring horizontal angle by reteration method. Also indicate under what circumstances it is preferred. **[6]**

c) Name the fundamental lines of a transit theodolite and also indicate their inter-relationships. **[5]**

)6) a) From the following observations on the traverse ABCD, calculate the length and bearing of the line AB. **[9]**

Line	CA	CD	DB
Length in m.	66.25	330.20	150.00
Bearing	250°45'	15° 20'	270° 15'

b) Explain stepwise procedure for carrying out theodolite traversing. Also, explain the sequential procedure of obtaining total co-ordinates from Gale's traverse table. **[8]**

)7) a) What are Ranges? Name different types of Ranges and their significance. **[5]**

b) Explain how leveling work is carried out in tunnel surveying. **[5]**

c) Explain the construction and use of Nautical sextant. **[7]**

)8) a) Explain by deriving necessary expressions the Double plane method to determine the reduced level of tip of an elevated tower. **[8]**

b) Calculate the length of CD and bearing of the line AB from the following traverse observations. **[8]**

Line	AB	BC	CD	DA
Bearings	Roughly East	178°0'	270° 0'	1° 0'
Length in m.	150.00	75.50	Not obtained	63.00

✦ ✦ ✦

Q6) Attempt any two of the following: [16]

a) Evaluate $\int_0^{1+i} (x^2 - iy)dz$ along the path

i) $y = x$

ii) $y = x^2$

b) Prove that $u = x^2 - y^2$ and $v = \frac{y}{x^2 + y^2}$ are harmonic functions of (x,y) but are not harmonic conjugates.

c) If $f(z) = u+iv$ is an analytic function of $z = x+iy$ and

$u-v = e^{-x}[(x-y)\sin y - (x+y)\cos y]$ find $f(z)$

♦ ♦ ♦

Total No. of Pages : 4

Seat No.	

S.E. (Civil Engg.) (Semester - III)
Examination, November - 2017
ENGINEERING MATHEMATICS - III
Sub. Code : 63338

Day and Date : Friday, 10 - 11 - 2017 **Total Marks : 100**
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of Calculator is allowed.

SECTION - I

Q1) Solve any three of the following. [18]

a) $(D^2 - D + 1)\, y = \cos 2x$

b) $(D^2 + 1)\, y = x^2 \sin 2x$

c) $(D^2 + 3D + 2)\, y = e^{e^x}$

d) The differential equation satisfied by a beam uniformly loaded with one end fixed and second subjected to a tensile force P is given by

$$EI\frac{d^2y}{dx^2} = Py - \frac{1}{2}Wx^2$$

Show that elastic curve for the beam under conditions $y = 0$, $\frac{dy}{dx} = 0$ at $x = 0$ is given by $y = \frac{W}{Pn^2}(1 - \cosh nx) + \frac{Wx^2}{2P}$ where $n^2 = \frac{P}{EI}$.

Q2) Attempt any two of the following. [16]

a) Find the directional derivative of $\phi = x^4 + y^4 + z^4$ at the point A(1, –2, 1) in the direction of AB where B is (2, 6, –1). Also find the unit vector normal to the surface $2x^2 + 4yz - 5z^2 = -10$ at (3, –1, 2).

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b) A vector field $\bar{F}$ is given by $\bar{F}=(x^2-yz)i+(y^2-zx)j+(z^2-xy)k$.

Show that $\bar{F}$ is irrotational and find its scalar potential. Also find Grad (div $\bar{F}$)

c) If $\bar{a}$ is a constant vector and $\bar{r}=xi+yj+zk$ then prove that

i) $\nabla(\bar{a}\cdot\bar{r})=\bar{a}$

ii) div $(\bar{a}\times\bar{r})=0$

iii) div $(\bar{a}\cdot\bar{r})\cdot\bar{a}=a^2$

iv) curl $(\bar{a}\times\bar{r})=2\bar{a}$

Q3) Attempt any two of the following. **[16]**

a) Fit a first degree curve to the following data and estimate the value of y when $x=73$

x:	10	20	30	40	50	60	70	80
y:	1	3	5	10	6	4	2	1

b) For the following data fit a curve of the form $y=ax^b$

$x=$	1	2	3	4	5	6
$y=$	1200	900	600	200	110	50

c) From the following data find the line of regression of y on x and of x on y

$x=$	62	64	65	69	70	71	72	74
$y=$	126	125	139	145	165	152	180	208

SECTION - II

Q4) Attempt any two of the following: **[16]**

a) Seven coins are tossed and the number of heads obtained is noted. The experiment is repeated 128 times and the following distribution is obtained.

No.of heads	0	1	2	3	4	5	6	7
Frequency	7	6	19	35	30	23	7	1

Fit a binomial distribution if (i) the coins are unbiased (ii) the nature of coins is not known.

b) A firm produces articles of which 0.1 percent are defective. It packs them in cases each containing 500 articles. If a wholesaler purchases 100 such cases, how many cases can be free from defectives, how many can be expected to have one defective.

c) In a sample of 1000 students, the mean marks of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find

i) how many students score between 12 and 15 marks?

ii) how many students score above 18 marks?

iii) how many students score below 8 marks?

iv) how many students score 16 marks?

(Given: For S.N.V.Z area between Z=0 to 0.4 is 0.1554, area between Z=0 to Z = 0.6 is 0.2257, area between Z=0 to Z = 0.8 is 0.2881, area between Z=0 to Z=1 is 0.3413, area between Z=0 to Z= 1.6 is 0.4452, area between Z=0 to Z=2.4 is 0.4918)

Q5) Attempt any three of the following. **[18]**

a) Find the Laplace transform of $\frac{\sin t\sin 5t}{t}$

b) Find the Laplace transform of $e^{-3t}\int_0^t u\sin 3u\,du$

c) Find the inverse Laplace transform of $\frac{s}{(s^2+1)(s^2+4)}$ using convolution theorem.

d) Use Laplace transform to solve $(D^2+4D+13)y=e^{-t}\sin t$ where $y(0)=0$ and $y'(0)=0$.

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Total No. of Pages : 2

Seat No.	

S.E. (Civil) (Part - II) (Semester - III) (Revised) Examination, November - 2017

BUILDING CONSTRUCTIONS & MATERIALS

Sub. Code : 63342

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of electronic calculator is permitted.**
4) **Assume suitable data if necessary and mention it clearly.**

SECTION - I

Q1) a) Classification of bricks according to IS standards? Also state water absorption and crushing strength limit for the same? **[8]**

b) Draw Cross section through external framed structure wall showing all components in sub structure mentioning their functional consideration. **[8]**

Q2) a) Draw a neat sketch of one and one and half brick thick Flemish Bond masonry. **[10]**

i) Plan of Odd and Even Course.

ii) Elevation for at least six courses.

b) State various types of material used for partition wall. **[6]**

Q3) Write short notes on any three : **[18]**

a) Door fixtures and fastening.

b) Lift.

c) Construction of Wall strip Foundation.

d) Rat trap bond.

e) Arches and their stability consideration.

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SECTION - II

Q4) Design and draw quarter turn staircase to a scale of 1 : 20 the plan and sectional elevation for following data **[25]**

a) Storey height : 3.20 m

b) Staircase internal size 4.8 × 5.8 m

c) Assume data wherever necessary.

Q5) Draw to a scale of 1 : 20 a sectional plan, side view and elevation for T.W. Paneled window for following data. **[25]**

a) Clear opening : 1.5 m × 1.2 m

b) Frame : 125 mm × 75 mm

c) End Style and meeting style : 120 mm × 40 mm

d) Rails : 120 mm × 40 mm

e) Panel material : partly glazed partly teak wood

f) Panel thickness : 20 mm

g) Glass : 4 mm thickness

h) No of shutter : 2 nos

i) No of panel : 4 nos

j) Shows various window fixtures and fastening.



SUK-BCE

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Total No. of Pages : 2

Seat No.	

S.E. (Civil) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

BUILDING DESIGN AND DRAWING

Sub. Code: 63348

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

3) **Assume suitable data if required and clearly mention it.**

SECTION - I

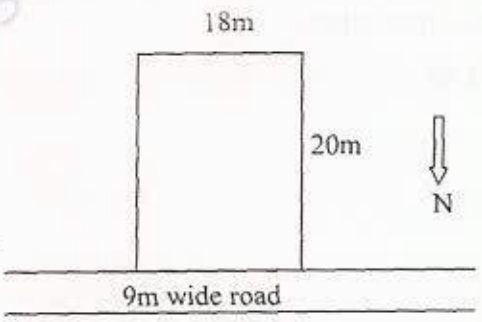
Q1) a) Explain the concept of F.S.I. **[5]**

b) Explain : Site Plan. **[5]**

OR

b) Write short note on 'Circulation' principle of a building planning. **[5]**

Q2) Plan a bungalow (G+1) on the given plot. The requirements are as below,



Name of Room	Tentative Size
Living Room	4 m X 5 m
Children Bed Room	5 m X 3.5 m
Master Bed Room	3.5 m X 4.5 m
Guest Bed Room	3 m X 4 m
Verandah	2.5 X 3 m
Store	1.3 X 2.5 m
Staircase	Suitable Size

Assume any other suitable data.

External walls – 230 mm thick. Internal walls – 150 mm thick.

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SUK-BCE

Draw to a suitable scale the following:

i) Building Plans (Ground and First Floor) [25]

ii) Furniture layout of Living Room [5]

Q3) Write short notes on any ***two:*** [10]

a) Aspect

b) Building Permission

c) Maintenance of building

d) Green building

SECTION - II

Q4) a) Explain the systems of plumbing with sketches. [10]

b) Explain : Intercepting Trap [6]

OR

b) Explain the types of wiring system. [6]

Q5) a) Explain the systems of ventilation with help of sketches. [10]

b) Explain the concept of thermal insulation. [6]

OR

b) Explain : Acoustics [6]

Q6) Write short notes on any ***three:*** [18]

a) Types of Pointing.

b) Characteristics of good paint.

c) Summer air conditioning.

d) Rain water harvesting.

e) Fire resisting building materials.

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Total No. of Pages : 3

Seat No.	

B.E. (Mech) (Part - IV) (Semester - VII) (Revised) Examination, November - 2017

REFRIGERATION AND AIR CONDITIONING

Sub. Code : 67501

Day and Date : Friday, 10 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :

1) **Attempt all questions.**
2) **Figures to the right indicates full Marks.**
3) **Used same answer book.**
4) **Neat diagram must be drawn.**
5) **Use of steam table, Refrigerant property tables/charts and psychrometric charts are allowed.**
6) **Make suitable assumptions if required.**

Q1) Attempt any two.

a) Derive an expression for performance of a reversed carnot refrigeration cycle with vapour refrigerant and mention the limitations. **[8]**

b) Explain reversed Brayton cycle for Air refrigeration, derive, an expression for COP and represent on T-s plot. **[8]**

c) i) Explain the following terms in brief. Energy ratios (EER) and Ton of Refrigeration. **[4]**

ii) A carnot refrigerator requires 1.4KW of power per Ton of refrigeration to maintain a space at -45°C. Determine; COP of a refrigerator and heat rejected in KJ per Ton. **[4]**

Q2) Attempt any two.

a) Explain in detail the methods of improving performance of a vapour compression refrigeration with help of P -H diagram. **[9]**

b) Draw cascade system on P-H and T-S plots with schematic diagram. Explain the System and write the expression for COP. **[9]**

c) A vapour compression system of 12TR capacity maintains an evaporator temperature of -8°c and condenser temperature + 30°c. Vapour is dry and saturated at entry to the compressor and compression is isentropic,

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Assuming actual COP 60% of the theoretical. Calculate;

i) Power input.

ii) Actual COP.

If Vapour is super heated by 5°c at suction to compressor, Calculate Power input and actual COP. (Assume saturated liquid at end of condenser in both cases.) **[9]**

Take, Cp of vapour is 0.733 KJ/Kg –K. Properties of Refrigerant.

Saturation	Specific Enthalpy		Specific Entropy	
Temperature	Liquid(h_f)	Vapour (h_g)	Liquid (Se)	Vapour (S_g)
–8°c	28.72KJ	184.07KJ	0.149KJ/kg-k	0.7 KJ/K K
+30°c	64.59KJ	199.62KJ	0.240KJ/kg-K	0.685KJ/kg–k

Q3) Attempt any two.

a) Enumerate the desirable properties of a good refrigerant and suggest the refrigerants used in. **[8]**

i) Reciprocating compressor

ii) Centrifugal Compressor.

iii) Axial compressor and justify your answer

b) Write a note on **[8]**

i) Ice plant.

ii) Dairy plant.

c) Describe the working of evaporative condenser with neat sketch. **[8]**

Q4) Solve any two.

a) i) Derive relation between relative humidity and degree of saturation (μ) with usual notations. **[4]**

ii) Explain Enthalpy deviation and show it on Psychrometric chart. **[4]**

b) The moist air is at 25°c DBT and 30% degree of saturation. The total pressure is 1.01325 bar, calculate Enthalpy and volume of air per Kg of dry air. **[8]**

c) Explain adiabatic mixing of moist air with injected water spray with the help of Psychrometric chart. Write the governing equations for the enthalpy and specific humidity. Draw the condition line with help of SHF scale given on the chart. **[8]**

Q5) Solve any two.

a) i) Explain briefly with sketch A.D.P, B.F, capacity of cooling coil and factors affecting them. **[5]**

ii) Write only the equation for air quantity over a cooling and dehumidifying coil using ESHF, ADP and B.F. **[4]**

b) Draw only the neat sketch of comfort chart giving numerical values. Explain human body regulatory process against heat and cold. **[9]**

c) The air at 30.5°c DBT and 55% R.H enters cooling coil at the rate of 300 cmm. The coil ADP is 13°c and BF is 0.1667. Calculate water vapour condensed and S.H.F using S.H.F Scale given on the chart. **[9]**

Q6) Solve any two.

a) Enumerate the sources of heat load for central Air conditioning system used for large building. **[8]**

b) Explain methods used for duet sizing in brief for supply air and return air. **[8]**

c) Write short notes on. **[8]**

i) Air distribution requirements.

ii) Types of outlets.

iii) Grilles.

iv) Diffusors.

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Total No. of Pages : 3

Seat No.	

B.E. (Mechanical) (Semester-VII) (Revised) Examination, November - 2017
FINITE ELEMENT ANALYSIS
Sub. Code : 67503

Day and Date : Wednesday, 15-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data if necessary and state it clearly.**
3) **Figures to the right indicate full marks.**

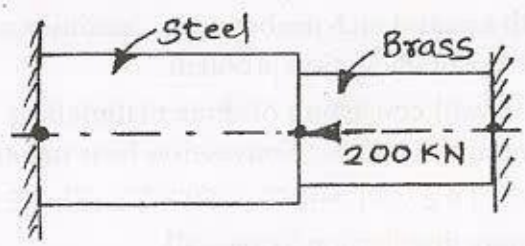
Q1) a) Explain in detail the general steps of finite element analysis. **[7]**

b) Explain the principle of minimum potential energy with the help of an example. **[7]**

OR

b) If a displacement field is described by $u = (-x^2 + 2y^2 + 6xy)*10^{-4}$ and $v = (3x + 6y - y^2)*10^{-4}$ determine ε_x, ε_y, γ_{xy} at the point $x = 1$, $y = 0$. **[7]**

Q2) a) Calculate the displacements, stress, strain and reactions for a stepped bar as shown in figure. Given: $A_{steel} = 400\ mm^2$; $A_{brass} = 300\ mm^2$; $L_{steel} = 500$ mm; $L_{brass} = 300$ mm; $E_{steel} = 200$ GPa; $E_{brass} = 70$ GPa; **[10]**



b) Derive the shape functions for a one dimensional quadratic element and sketch the variation of each shape function along the entire element. **[8]**

OR

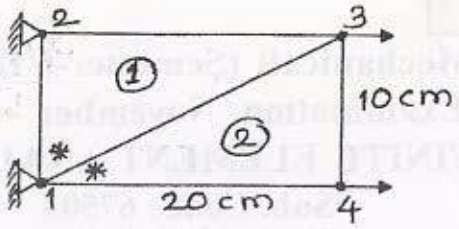
b) Explain the elimination and penalty method with the help of an example. **[8]**

Q3) a) Classify the elements by virtue of their interpolation function and state their merits and demerits. **[6]**

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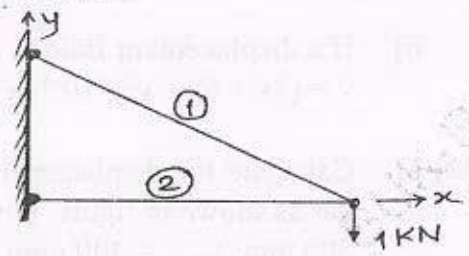
b) Calculate the shape functions for the elements shown in figure [12]



Q4) a) A long cylinder of inside diameter 80mm and outside diameter 120mm snugly fits in a hole over its full length. The cylinder is then subjected to an internal pressure of 2 MPa. Draw the sketch showing actual problem and also model the problem for a sample length of 10mm using two axisymmetric triangular elements with proper forces and boundary conditions. Also show the element connectivity table and coordinates of all nodes. [8]

b) Calculate the displacements in global coordinate and local coordinate systems for a truss shown in figure. [10]

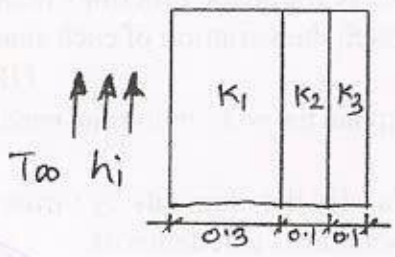
$A_1 = 80\ mm^2$
$A_2 = 40\ mm^2$
$L_1 = 1000\ mm$
$L_2 = 800\ mm$
$E_1 = E_2 = 200\ GPa$



Q5) a) Explain with a neat sketch the boundary conditions for a two dimensional steady state heat conduction problem. [6]

b) A composite wall consisting of three materials as shown in figure. The outer temperature is 40°C. Convection heat transfer takes place on the inner surface of the wall with $T_\infty = 500°C$ and $h = 25\ W/m^2°C$. Determine the temperature distribution in the wall. [8]

$k_1 = 20\ W/m\ °C$
$k_2 = 30\ W/m\ °C$
$k_3 = 50\ W/m\ °C$
$T_o = 40\ °C$
$L_1 = 0.3\ m$
$L_2 = 0.1\ m$
$L_3 = 0.1\ m$



Q6) a) Explain in detail the steps to be carried out in commercial FEA software for obtaining the displacement in a stepped bar each of length L/2, fixed at one end and subjected to axial force P at the other end. [12]

b) Explain the measures of element distortion in a finite element analysis package. [6]

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Total No. of Pages : 2

Seat No.	

B.E. (Mechanical) (Part - IV) (Semester-VII) Examination, November - 2017

AUTOMOBILE ENGINEERING (Elective - 1)

Sub. Code : 67506

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat sketch wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Make suitable assumption if necessary.**
5) **Use of non-programmable calculator is allowed**

Q1) a) Compare the front engine front wheel drive and front engine rear wheel drive with its advantages and disadvantages. **[8]**

b) Which are the different types of vehicle body? List the body parts. **[8]**

Q2) a) Describe briefly parts of the clutch. With its function. **[8]**

OR

How are the clutches are classified? Explain with neat sketch diagram spring type. Clutch.

b) What is a need of differential. Explain its operation with neat sketch. **[9]**

Q3) a) Explain steering geometry. **[9]**

OR

What is mean by slip angle, understeer and oversteer.

b) Which are the different types of springs used in suspension system. **[8]**

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Q4) a) Define following and explain it relevance. **[8]**

i) Brake efficiency
ii) Stopping distance
iii) Braking force
iv) Power brakes.
v) Servo brakes
vi) Anti lock braking
vii) Brake bleeding
viii) Brake fadding

b) What are the various tyre nomenclature, show with a figure? List factors affecting tyre performance. **[8]**

OR

c) Explain need and effect of ABS in automotive brakes. Explain how safety can be improved with the help of ABS. **[8]**

Q5) a) Explain with neat sketch working of lead acid battery. List and explain battery performance parameters and how to measure then? **[8]**

b) Explain with neat sketch Electronic controlled management system used in automobile showing all necessary components. **[9]**

OR

c) Explain with neat sketch alimetiser automotive air conditioning system. **[9]**

Q6) a) Following are the vehicle specifications, wt. of vehicle = 62.29 KN, Kr=0.018 Ka = 0.0276, Transmission efts, in top gear = 90 %, Top gear ratio = 6.2, second gear ratio = 15, transmission efficiency in second gear = 80%, frontal area = 5.574 m^2, wheel dia = 0.81 mts, **[12]**
Calculate.

i) Engine power required.
ii) Engine speed required.
iii) Maximum possible grade in second gear at above speed.
iv) Maximum drabar pull in second gear at above speed.

b) Write a note on various resistances to vehicle motion. **[5]**

OR

c) What B effect of wt. Distribution on vehicle performance and drive selection. **[5]**

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Total No. of Pages :2

Seat No.	

B.E. (Mechanical Engineering) (Semester - VII) Examination, November - 2017

TOTAL QUALITY MANAGEMENT (Elective - II)

Sub. Code: 67833

Day and Date :Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumptions wherever necessary and state them clearly.**
4) **Use of statistical tables and scientific calculator is permitted.**

Q1) Solve any Two.

a) Track the journey-Inspection, Quality Control, Quality Assurance and Quality Management. **[8]**

b) Enumerate customer compliant redressal mechanism being followed in an organization known to you. **[8]**

c) What are the needs, wants and expectations of Internal Customers? **[8]**

Q2) Solve any Three.

a) How Quality of design and quality of conformance decided? **[6]**

b) How control over vendor quality is established? **[6]**

c) Describe seven QC tools used in problem solving process. **[6]**

d) What is Six Sigma? What are the steps involved in implementing it in an organization? **[6]**

Q3) Solve any Two.

a) What do you mean by parallel, series and combined system reliability? Give suitable examples. **[8]**

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b) What are the applications of reliability tests? [8]

c) Three subsystems are reliability - wise in series and make up a system. Subsystem 1 has a reliability of 94.6%, subsystem 2 has a reliability of 99.7% and subsystem 3 has a reliability of 92.8% for a mission of 100 hours. What is the overall reliability of the system for a 100 hour Mission? [8]

Q4) Solve any Two.

a) How TQM differs from tradional management approach? [8]

b) What are the focus areas of Theory of Constraints? Prepare a brief write up on Feignbaum's theory of TQC. [8]

c) Explain any one approach to TQM followed by an organization known to you. [8]

Q5) Solve any Three.

a) Quality Policy deployment and quality function deployment lead to increase in customer satisfaction. How? [6]

b) An organization wishes to develop quality culture. How TQM can help the organization? [6]

c) Quality objectives should be SMART. Give a list of quality objectives set by an organization based on SMART philosophy. [6]

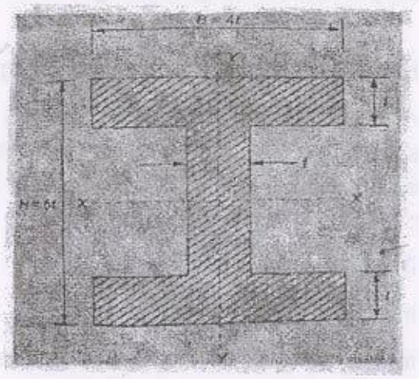
d) Share details of any TQM technique implemented by an organization. Has it been successful? If yes, why? If no, why? [6]

Q6) Solve any Two:

a) Elaborate SERVQUAL model in details. [8]

b) What are the steps involved in implementation of ISO : 9001:2008. [8]

c) What are the criteria used to decide winner of CII - Exim Quality Award? [8]



$$(A)=11t^2,\ I_{xx}=\left(\frac{419}{12}\right)t^4 \text{ and } y=\left(\frac{5t}{2}\right)$$ [8]

Q6) a) What is adequate design and Optimum design? Explain with suitable Examples? [8]

OR

a) Explain relation between functional requirement parameters group, geometrical parameters group and material parameters group in the optimum design of machine Elements. [8]

b) A tensile bar of length 500mm is subjected to the constant tensile force of 3000N. If the factor of safety is 2, design the bar with the objective of minimizing the material cost, out of the following materials [8]

Sr.No.	Material	Mass Density (ρ)Kg/m^3	Material Cost Per Unit Mass (c) Rs/Kg	Tensile Yield Strength (S_{yt}) N/mm^2
01	Plain carbon steel	7800	28	400
02	Alloy steel	7850	150	900
03	Aluminium Alloy	2800	132	150
04	Titanium Alloy	4500	2200	800

Total No. of Pages : 4

Seat No.

B.E. (Mechanical) (Semester - VII) (New Course)
Examination, November - 2017
MECHANICAL SYSTEM DESIGN
Sub. Code : 67502

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary and state it clearly.**
3) **Draw neat labeled sketches wherever necessary.**

Q1) a) With suitable example, explain effect of appearance, shape, colour and proportion in Aesthetic Design. [8]

b) Explain ergonomic consideration in design of Pressure Cooker. [8]

OR

b) What is creativity and explain the role of creativity in the design of a product. [8]

Q2) a) Explain the concept of pre-stressing in thick pressure vessels with suitable examples. [6]

OR

a) Classify unfired pressure vessels as per IS 2825-1969 code. [6]

b) A cylindrical pressure vessel shell of inside diameter 1500mm is subjected to an internal pressure of 2 MPa .The shell as well as heads are made of low alloy steel with an ultimate tensile strength of 450N/mm^2. The double welded butt joints which are spot radiographed (η= 0.85) ,are used to fabricate the vessel. The corrosion allowance is 3mm. Determine the thickness of the cylindrical shell and the thickness of the head if the heads are: [12]

i) Flat Head
ii) Plain Formed
iii) Hemispherical
iv) Torispherical with crown radius of 1125mm

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3) a) Explain with neat sketches self-energizing, self - locking and uncontrolled braking conditions in short shoe block brake. [8]

b) A multi-disk plate clutch consists of five steel plates and four bronze plates. The inner and outer diameters of the friction disks are 75 and 150mm respectively. The coefficient of friction is 0.1 and the intensity of pressure on friction lining is limited to 0.3 N/mm². Assuming uniform wear theory, calculate: [8]

i) Required force to engage the clutch and

ii) Power transmitting capacity at 750 rpm.

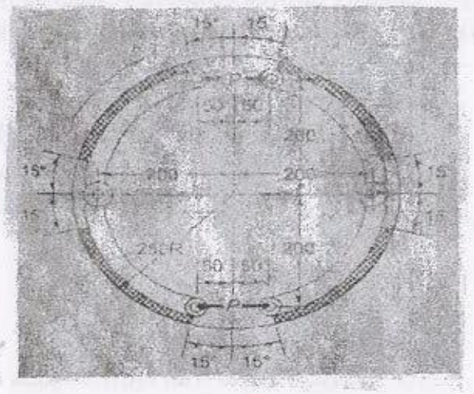
OR

b) An internal expanding brake with four identical shoes is shown in figure below. Each hinge pin supports a pair of shoes . The actuating mechanism is designed in such a way that it produces the same force P on each of the four shoes . The face width of the friction lining is 50 mm and the maximum intensity of normal pressure is limited to 1N/mm². The coefficient of friction is 0.30 [8]

Calculate :

i) The actuating force P.

ii) The torque absorbing capacity of the brake.



4) a) Basic considerations in design of multi speed gear box. [6]

OR

a) Explain the procedure for selecting optimum structure diagram. [6]

b) A three-stage, twelve speed gear box is to be designed for multi spindle speeds varying between 60 r.p.m and 2880 r.p.m. The second stage consists three speed steps if the gear box is driven by 5kW, 1440 r.p.m. electric motor: Assume same module for all gears. [12]

i) Draw the speed ray diagram.

ii) Draw the gearing diagram.

iii) Determine the number of teeth on gears.

5) a) Explain briefly guidelines for design of piston ring. [8]

b) The cylinder of a four stroke diesel engine as the following specifications [8]

Brake power = 3.00 kW.

Speed = 800 rpm.

Indicated Mean Effect Pressure = 0.30 MPa.

Mechanical Efficiency = 70%

Determine the bore and length of the cylinder liner.

OR

b) The following data is given for a connecting rod:

Engine speed =2000rpm.

Length of connecting rod =300mm.

Length of stroke = 160mm.

Density of material =7800 kg/m³

Thickness of web or flanges = 6 mm

Assume the cross-section of the connecting rod as shown in figure for which Area of cross section, calculate the whipping stress in the connecting rod.

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Semester - III) (Revised) Examination, April - 2018

FLUID MECHANICS

Sub. Code: 63354

Day and Date : Saturday, 28 - 04 - 2018 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Neat diagrams must be drawn wherever necessary.**
3) **Figures to the Right indicate full marks.**
4) **Use of non programmable calculator is allowed.**
5) **Assume suitable data if necessary.**

Q1) a) Define surface tension and show that the gauge pressure within a liquid droplet varies inversely with the diameter of the droplet. **[6]**

b) A U tube containing water has two limbs of internal diameters 3 mm and 8 mm respectively. The free surfaces of water are observed to be having approximately zero contact angles with the U tube surface. What is the approximate difference of water level between the two limbs? Surface tension coefficient and density of water are 0.073 N/m and 1000 Kg/m^3 respectively. **[6]**

c) Explain the terms stable, unstable and neutral equilibrium with reference to the floating bodies. **[4]**

Q2) a) The velocity field in a fluid flow is given by $V = x^2ti + 2xytj + 2yztk$ where x, y and z are given in metre and time t in seconds. Determine the velocity vector at a point (2, –1, 1) at time $t = 1$ second. Also determine the magnitude of velocity and acceleration of the flow for the given location and time. **[8]**

b) Solve any one of the following : **[8]**

i) Define stream function and velocity potential. Show that the lines of constant stream function and velocity potential must intersect orthogonally.

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ii) Explain briefly the phenomenon of propagation of elastic waves in a compressible fluid and hence define zone of action and zone of silence.

3) a) i) Starting from steady flow energy equation show how Bernoulli's equation for an inviscid incompressible fluid can be obtained. **[4]**

ii) State the momentum equation. How will you apply momentum equation for determining the force exerted by a flowing fluid on a pipe bend? **[5]**

b) Solve any one of the following : **[9]**

i) Gasoline of specific gravity 0.8 is flowing upwards in a vertical pipeline which tapers from 30 cm to 15 cm diameter. A gasoline mercury differential manometer is connected between 30 cm and 15 cm pipe section to measure the rate of flow. The distance between the manometer tappings is 1 metre and gauge reading is 0.5 metre of mercury find

1) Differential gauge reading in terms of gasoline head.

2) Rate of flow. Neglect friction and other losses between tappings.

ii) A 300 mm × 150 mm venturimeter is to be replaced by an orificemeter both the meters are to give the same differential mercury manometer reading for a discharge of 100 lit/sec and the inlet diameter to remain as 300 mm. What should be the diameter of orifice? The coefficient of discharges of the venturimeter and orificemeter are 0.98 and 0.6 respectively. Assume the working fluid as water.

4) a) i) Explain why there is a need of defining correction factors for kinetic energy and momentum? And hence define kinetic energy correction factor and momentum correction factor. **[4]**

ii) Explain the concept of Total Energy Line and Hydraulic gradient Line. **[4]**

b) An oil of dynamic viscosity 20 centipoise and density 1200 Kg/m^3 flows through a 2.5 cm diameter pipe 250 metre long. What is the maximum flow in m^3/s that will ensure laminar flow? What would be the pressure drop for this flow? **[8]**

5) a) Show that the loss of head due to friction in a circular pipe can be expressed as $h_f = fLV^2/2gD$ where f is friction factor, L is length of pipe, V is average velocity and D is diameter of pipe. **[9]**

b) Solve any one of the following : **[9]**

i) Two pipelines of equal length and with diameters of 20 cm and 30 cm are in parallel and connect two reservoirs. The difference in water levels in the reservoirs is 4 metres. If the friction factors are assumed to be equal, find the ratio of the discharges due to the large diameter pipe to that of the smaller diameter pipe. Neglect all minor losses.

ii) Water is flowing through a horizontal pipe when the diameter of the pipe is suddenly enlarged from 20 cm to 40 cm, the hydraulic gradient line rises by 15 mm. Find the rate of flow of water.

6) a) Explain the effect of pressure gradient on boundary layer separation. **[8]**

b) Solve any one of the following : **[8]**

i) The power P required to run a centrifugal pump depends on the impeller diameter D, the rotational speed N, the rate of discharge Q, density ρ and viscosity μ. Using Buckingham's π theorem obtain an expression for power of the form $P = \rho N^3 D^5 \Phi\left[\left(Q/ND^3\right), \left(\mu/\rho ND^2\right)\right]$.

ii) A truck having a projected area of 6.5 m^2 travelling at 70 Km/hr has a total resistance of 2000 N of this 20 percent is due to rolling friction and 10 percent due to surface friction. The rest is due to form drag. Make calculations for the coefficient of form drag. Take density of air as 1.22 Kg/m^3.

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester - III)
(Revised) Examination, April -2018
METALLURGY
Sub. Code : 63353

Day and Date :Friday, 27 - 04 - 2018 **Total Marks : 100**

Time : 2.30 p.m to 5.30 p.m.

Instructions :
1) **Solve any three questions from each section.**
2) **Answer for both sections to be written in the same answer book.**
3) **Figures to the right indicate full marks.**
4) **Draw neat figures wherever necessary.**

SECTION - I

Q1) Answer any three of the following. Each question carries equal marks. **[18]**

a) What is Coring and Dendritic structure? Explain with neat sketches.

b) Explain what cooling curves are. Draw different types of cooling curves and evalute degree of freedom (DOF) of anyone using Gibbs phase rule.

c) What are Hume Ruthery rules for Substitutional Solid Solutions? Explain.

d) Explain what are Eutectic, Eutectoid and Peritectic transformations?

Q2) a) Draw Fe-Fe_3C equilibrium diagram. Indicate all the phases, Temperatures and Compositions. **[8]**

b) Suggest suitable materials for any four of the following and justify the same. **[8]**

i) Steel used in RCC

ii) Gears

iii) Machine tool Column

iv) Tools used in

v) Restaurant pots and pans

vi) Bearing material

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P.T.O.

)3) a) What are Malleable cast Irons? Explain the manufacturing process? Draw typical microstructure of Malleable and Gray cast iron and compare their properties. [7]

b) Draw self explanatory sketches of any three. [9]

i) Typical Microstructures of medium carbon steel and high carbon steels.

ii) Microstructures of White and gray cast irons.

iii) Microstructures of α & $\alpha + \beta$ brasses.

iv) Sn-Sb equilibrium diagram.

v) Substitutional and Interstitial solid solutions.

vi) Standard specimen for Charpy and Izod impact testing.

)4) Write short notes on any four. [16]

a) Water hardenables Tool steels.

b) Stainless steels.

c) Rockwell hardness testing.

d) Cast iron.

e) Ultra sonic Testing.

SECTION - II

)5) a) Draw Flowchart for manufacturing of self lubricating bearings? Explain why oil impreganation is must in this process? [9]

b) Draw TTT diagram for hypo eutectoid and hyper eutectoid steels and explain why mild steel cannot be hardened by quenching? [9]

)6) a) Explain precipitation hardening in Al-Cu alloy w.r.t. composition, aging temperature and time, hardness variations. [8]

b) Elaborate case hardening processes, which steels are carburized and what is the significance of case depth? How it is measured? [8]

)7) Differentiate clearly between any four of the following. [16]

a) Hardening and softening processes.

b) Compacting and sintering.

c) Austempering and martempering.

d) Flame and induction hardening.

e) CCT and TTT diagram.

)8) Write short notes on any four of the following. [16]

a) Oxidation and decarburization defects.

b) Austenitic grain size.

c) Austenite to Pearlite transformation.

d) Different Powder manufacturing methods.

e) Heat treatment furnaces.

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part-II) (Semester - III) (Revised) Examination, April - 2018

APPLIED THERMODYNAMICS

Sub. Code : 63352

Day and Date : Thursday, 26 - 4 - 2018 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary.**
4) **Use of steam table & Mollier chart are allowed.**
5) **Use of non-programmable calculator is allowed.**

Q1) a) Explain equivalence of Kelvin-Planck and Clausius statement of second law. **[8]**

OR

b) Explain Available energy, Unavailable energy and Dead state. **[8]**

c) State and prove Clausius Inequility. **[8]**

Q2) a) Draw P - V, T - V and P - T diagram for water - steam pure substance. **[8]**

OR

b) Write note on Reheat and Regenerative steam power cycles. **[8]**

c) A simple Rankine cycle steam power plant operates between temperatures of 260°C to 95°C. The steam is supplied to the turbine at a dry saturated condition. In the turbine, it expands in isentropic manner. Determine the efficiency of Rankine cycle, net work done and SSC. **[8]**

Q3) a) Classify boilers and compare between water tube and fire tube boilers. **[8]**

OR

b) Classify steam condensers and compare between surface and jet condensers. **[8]**

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Q4) c) During a trial on a steam condenser, the following observations were made **[10]**

Condenser Vacuum	680 mm of Hg
Barometer reading	764 mm of Hg
Mean condenser temperature	36.2°C
Hot well temperature	30°C
Condensate formed per hour	1780 kg
Circulating cooling water inlet temperature	20°C
Circulating cooling water outlet temperature	32°C
Quabtity of cooling water	1250 kg/min

Determine:

i) Condenser Vacuum corrected to standard barometer

ii) Vacuum Efficiency

iii) Under cooling of condensate

iv) Condenser efficiency

v) Condition as steam as it enters the condenser

Take the specific heat of water as 4.186 kJ/kgK

Q4) a) What is the effect of friction on the flow through a steam nozzle? Explain with the help of h - S diagram. **[8]**

OR

Derive an expression for mass of steam discharged through nozzle.

b) A convergent divergent nozzle is to be designed when pressure of entering steam is of 15 bar with dryness fraction of 0.97. The exit pressure is 0.2 bar. The mass flow rate is 9 kg/kw. hr. If the power developed is 220 kw determine: **[9]**

i) Throat pressure

ii) The number of nozzles required if each nozzle has a throat of rectangular C/S of 4 mm × 8 mm.

Take frictional heating as 78.96 kJ/kg.

Q5) a) Explain with the help neat sketch a single stage impulse turbine. Also explain the pressure and velocity variations along the axial direction. Draw combined velocity triangle of impulse turbine. **[9]**

b) A simple impulse turbine has one ring of moving blades running at 150 m/s. The absolute velocity of steam at exit from the stage is 85 m/s at an angle of 80° from the tangential direction. Blade velocity ci-efficient is 0182 and the rate of steam flowing through the stage is 2.5 kg/s. If the blades are equiangular, determine **[8]**

i) Blade angles

ii) Nozzle angle

iii) Axial thrust

iv) Absolute velocity of steam at inlet

Q6) a) Explain the term reheat factor why it's magnitude is always greater then unity? **[8]**

OR

Which are the different governing methods of steam turbine. Explain any one of them.

b) In a Parson's reaction turbine of 50% degree of reaction running at 1500 rpm, the available enthalpy drop for an expansion is 62.8 kJ/kg. If the mean diameter of the rotor is 1 m. Find number of rows of moving blades required. The blade outlet angle is 20° and speed ratio is 0.7. Assume stage efficiency as 80%. **[8]**

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Semester - III) Examination, April - 2018

ELECTRICAL TECHNOLOGY

Sub. Code : 63351

Day and Date : Wednesday, 25 - 4 - 2018 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat figures wherever necessary.**
4) **Assume suitable data, if missing. State it clearly.**

Q1) a) Explain the function of **[1×8]**

i) Field winding ii) Armature winding

iii) Commutator iv) Interpoles in a dc motor

OR

Differentiate between dc shunt motor and dc series motor about

i) Field winding design ii) Torque speed characteristics

iii) Starting torque iv) Applications

Answer any two of the following (b, c, d): **[2×6]**

b) Explain the principle of reversing rotation of dc motor. Draw appropriate circuit diagrams.

c) Explain the basic methods of speed control of dc series motor.

d) A DC shunt motor runs at 1200 rpm driving a constant torque load by taking 10 A armature current from 200 V supply. Now 5 ohm resistance is series with the armature winding. Find the new armature current and new speed. The armature resistance is 0.6 ohm.

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)2) Answer any TWO: [2×8]

a) Explain the working of 3 phase induction motor.

b) Compare two types of 3 phase induction motor with different rotor constructions.

c) Torque of 3 phase induction motor is given by $\frac{120 s E_2^2 R_2}{2\pi N_s \left(R_2^2 + s^2 X_2^2\right)}$ where E_2, R_2, X_2, s, N_s are rotor induced emf per phase at standstill, Rotor resistance per phase, Rotor reactance per phase at standstill, slip and synchronous speed respectively. Write the value of slip and expression for torque

i) At starting

ii) When the torque is maximum

iii) If rotor speed = Synchronus speed

)3) Answer any TWO: [2×8]

a) Why does induction motor draw large current at large slip? Explain basic methods of reducing starting current of induction motor.

b) Compare different methods of speed control of induction motor on the basis of

i) Effect on starting torque

ii) Suitability to different types of rotor

iii) Effect on current drawn while driving constant torque load

c) Explain the principle of rotation reversal of 3 phase induction motor. Draw necessary circuit diagrams.

)4) Answer any TWO: [2×8]

a) What is the difference between drive motor and servo motor? Describe methods of controlling dc servo motor.

b) Describe the construction and working of any one type of stepper motor.

c) Describe a linear induction motor. State its applications.

)5) Answer any TWO: [2×8]

a) State starting and braking requirements of following load and state one suitable motor for each.

i) Paper mill ii) Drilling machine

iii) Rolling mill iv) Conveyor

b) Explain with examples the terms - active load, passive load, multimotor drive.

c) Classify mechanical loads based on how the torque requirement changes with driving speed. Explain.

)6) Answer any TWO: [2×8]

a) Compare core type induction furnace with coreless induction furnace.

b) State basic principle of producing large heat for industrial use by using electric power. How is this principle adapted in resistance furnace, induction furnace, arc furnace.

c) Find the input power to a furnace required to melt 500 kg metal scrap per hour. The scrap is preheated to 100 deg. C. Efficiency of furnace 60%, latent heat constant of metal 270 J/kg, specific heat constant of metal 450 J/kg, melting point = 1500 deg. C.

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical Engg.) (Semester - III) (Revised) Examination, April - 2018

ENGINEERING MATHEMATICS -III

Sub. Code :63350

Day and Date : Tuesday, 24- 04 - 2018 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**
4) **Assume suitable data if necessary.**

SECTION - I

Q1) Attempt any Three of the following.

a) Solve $\left(D^2-4D+4\right)y=x^3+\cos 2x$ **[6]**

b) Solve $\left(D^3-7D^2+10D\right)y=e^{2x}\sin x$ **[6]**

c) Solve $\frac{d^2y}{dx^2}+3\frac{dy}{dx}+2y=\sin e^x$ **[6]**

d) Solve $x^2\frac{d^3y}{dx^3}+3x\frac{d^2y}{dx^2}+\frac{dy}{dx}+\frac{y}{x}=x^2\log x$ **[6]**

Q2) Attempt any one of the following.

a) The differential equation of a shaft which is whirling with the line bearings horizontal is given by $EI\frac{d^4y}{dx^4}-\frac{W\omega^2}{g}y=W$, where W is the weight of the shaft and ω is the whirling speed. Taking the shaft of length $2l$ with the origin as its centre and short bearing at both ends i.e. for $x=\pm l, y=\frac{d^2y}{dx^2}=0$ show that $y=\frac{g}{2\omega^2}\left[\frac{\cos mx}{\cos ml}+\frac{\cosh mx}{\cosh ml}-2\right]$, where $m^4=\frac{W\omega^2}{EIg}$ **[16]**

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b) A spring at the upper end supports a weight of 980 gm at its lower end. The spring stretches ½ cm under a load of 10 gm and the resistance (in gm wt.) to the motion of the weight is numerically equal to the 1/10 of the speed of weight in cm/sec. The weight is pulled down ¼ cm below its equilibrium position and then released. Find the expression for the distance of weight from its equilibrium position at time t during its first upward motion. **[16]**

3) Attempt any four of the following.

a) Show that $\vec{V} = 2xyz\vec{i} + (x^2z + 2y)\vec{j} + x^2y\vec{k}$ is irrotational and hence find a scalar potential function $u(x, y, z)$ such that $\vec{V} = \text{grad } u$ **[4]**

b) Find angle between surfaces $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at a point $(2, -1, 2)$ **[4]**

c) If $\vec{a}$ is a constant vector and $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ then prove that

i) $div(\vec{a} \times \vec{r}) = 0$

ii) $curl(\vec{a} \times \vec{r}) = 2\vec{a}$ **[4]**

d) If $\vec{F} = (x+y+1)\vec{i} + \vec{j} - (x+y)k$, find the value of $\vec{F}$. curl $\vec{F}$ **[4]**

e) If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ and $r = \sqrt{x^2 + y^2 + z^2}$ then prove that $\nabla(r^2e^r) = (r+2)e^r\vec{r}$ **[4]**

SECTION - II

4) Attempt any three questions from the following.

a) Find Laplace transform of $\frac{1}{t}(\cos 6t - \sin 4t)$ **[6]**

b) Find Inverse Laplace transform of $\frac{3s+1}{(s-1)(s^2+1)}$ **[6]**

c) Solve using Laplace transform method $\frac{dy}{dt} + 3y + 2\int_0^t y\,dt = t$, given that $y(0) = 0$ **[6]**

d) Find the Laplace transform of $\frac{te^{3t}\sin t\cos t}{2}$ **[6]**

5) Attempt any two from the following.

a) Obtain Fourier series for $f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \le x \le 0 \\ 1 - \frac{2x}{\pi}, & 0 < x \le \pi \end{cases}$ and hence deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}$ **[8]**

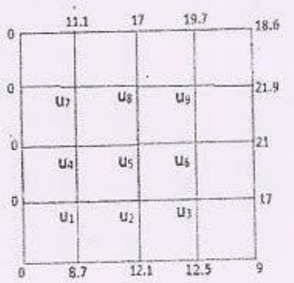
b) Obtain the Fourier series expansion for the function $f(x) = x + x^2$ in $(-1, 1)$. **[8]**

c) Find half range sine series for $f(x) = \begin{cases} x, & 0 < x < \pi/2 \\ \frac{\pi}{2}, & \pi/2 < x < \pi \end{cases}$. **[8]**

6) Attempt any one from the following.

a) An elastic string stretched between two fixed points at a distance 'l' apart. One end is taken at origin and at a distance $\frac{2l}{3}$ from this end the string is displaced a distance k transversely and is released from rest when in this position. Find $y(x, t)$ the vertical displacement, if y satisfies the equation $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ **[16]**

b) Solve the Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ for the following square mesh with boundary values as shown in figure by Gauss-Siedal iterative method by performing four iterations. **[16]**



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Q2) Attempt any four:

a) How is the work study useful in improving productivity? **[4]**

b) Differentiate between method study & work measurement. **[4]**

c) Illustrate the steps of conducting method study. **[4]**

d) Draw Flow process chart for any one of the welding process. **[4]**

e) Draw two handed process chart for cutting a glass tube. **[4]**

Q3) Write short notes on any three:

a) Principles of motion economy related to work place layout. **[6]**

b) MEMO motion study. **[6]**

c) SIMO Chart. **[6]**

d) Design of machinery from ergonomics point of view. **[6]**

Q4) Attempt any three:

a) Define time study & explain its objectives. **[6]**

b) Describe various methods used for rating in time study. **[6]**

c) In the following table, times shown are continuous stopwatch readings in minutes. Initial setting of stopwatch is at 0.00. **[6]**

Elements	Cycle time (in minutes)				Performance rating in %
	1	2	3	4	
A	1.7	8.55	15.5	22.5	105
B	2.9	9.8	16.75	23.75	90
C	4.5	11.4	18.4	25.35	110
D	6.8	13.8	20.75	27.65	100

Relaxation allowance as 15%. Estimate the standard time of operations and production per 8 hours of shift.

d) State and explain the areas of production where work sampling can be useful. **[6]**

Q5) Attempt any four:

a) Name and discuss the factors which you need for selection of a plant site for food processing industry. **[4]**

b) What are the various types of layouts? State the application of each. **[4]**

c) Explain the tools used in designing the plant layout. **[4]**

d) Define material handling. State the objective of material handling. **[4]**

e) Which type of layout do you recommend for a gear manufacturing company? Give reasons. **[4]**

Q6) Write short notes on any four:

a) Steps involved in value analysis. **[4]**

b) Applications of value analysis. **[4]**

c) Procedure of job evaluation. **[4]**

d) Objectives of merit rating. **[4]**

e) Ranking method of merit rating. **[4]**

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Total No. of Pages : 3

Seat No.	

B.E. (Mechanical) (Part - IV) (Semester - VIII) (Revised)

Examination, May - 2018

INDUSTRIAL ENGINEERING (Elective - III)

Sub. Code: 68511

Day and Date : Monday, 14 - 05 - 2018 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**

Q1) Attempt any four:

a) Describe briefly various functions of industrial engineering. **[4]**

b) Discuss the applications of industrial engineering in establishing a foundry unit. **[4]**

c) Define productivity . Describe any two models used in productivity measurement. **[4]**

d) What are the benefits to various stake holders from productivity? **[4]**

e) A manufacturing unit is producing 22,000 units of a engine per month by employing 200 workers in 8 hours shift. The company gets an additional order to supply 3000 engines. The management has decided to employ additional workers. What will be the production and productivity levels when the number of additional workers employed is **[4]**

i) 20

ii) 30

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Q2) a) Derive the equation of Force Transmissibility. Also explain plot of transmissibility versus frequency ratio. [8]

b) A single cylinder vertical petrol engine of total mass 320 kg is mounted upon a steel chassis and causes static deflection of 2 mm. The reciprocating parts of engine have a mass of 24 kg and move through a vertical stroke of 150 mm with SHM. A dashpot attached to the system offers a resistance of 490 N at a velocity of 0.3 m/s. Determine,

i) The speed of driving shaft at resonance and

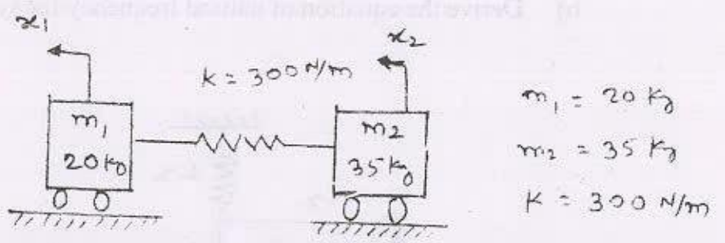
ii) The amplitude of steady state vibration when the driving shaft rotates at 480 rpm. [10]

Q3) a) Explain torsionally equivalent shaft. [8]

OR

a) With the help of neat sketch explain Dry Friction Damper. [8]

b) Derive the equation of natural frequency and mode shapes for the system of two masses shown in figure. [8]



Q4) a) Derive the equation of motion for multi degree spring mass system. [8]

OR

Explain Maxwell reciprocal theorem.

b) Determine the natural frequencies of the system shown in fig. 4b using Matrix Iteration Method. Solve up to first mode shape. [10]

Q5) a) Explain in brief with neat sketch the instruments Vibrometer, Frahm's Tachometer. State whether used to measure displacement, velocity and/or frequency. [8]

b) An undamped vibration pick up has a natural frequency of 1 cps. It is used to measure a harmonic vibration of 4cps. If the amplitude indicated by the pickup is 0.125 cm, what is the correct amplitude? [8]

Q6) Attempt any two: [16]

a) Write short note on Octave band analysis and its importance.

b) Discuss Subjective and objective assessment of sound.

c) At a distance of 4 m from a point source, the sound pressure level is 92 dB. Assuming a free progressive spherical wave, and standard atmospheric conditions, calculate the sound pressure level at source.

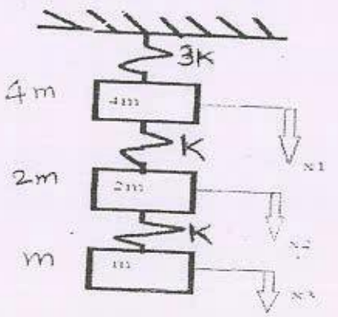


Fig 4b

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Total No. of Pages : 3

Seat No.	

B.E. (Mech.) (Part - IV) (Semester - VIII) Examination, May - 2018
NOISE AND VIBRATION
Sub. Code: 68510

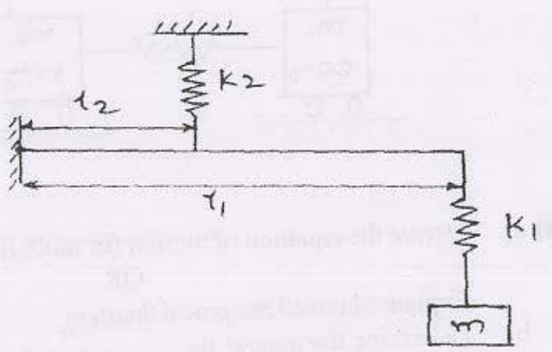
Day and Date : Friday, 11 - 05 - 2018 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary.**
3) **Draw neat sketch wherever necessary.**

Q1) a) Enlist different methods of vibration analysis. Using Equilibrium method derive equation of motion for standard spring - mass - system. **[8]**

b) Derive the equation of natural frequency for system shown in figure. **[8]**



OR

b) A vibrating system consists of a mass of 50 kg, a spring of stiffness 30 kN/m and a damper. The damping provided is only 20% of the critical value. Determine the damping factor, critical damping coefficient, natural frequency of damped vibrations, logarithmic decrement and the ratio of two consecutive amplitudes. **[8]**

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)3) Attempt any two: [16]

a) How the wind mills are classified? Explain with schematic diagram of a VAWT?

b) Discuss the working principle of open cycle OTEC plant with neat sketch. Write their advantages and disadvantages.

c) Explain with neat sketch hybrid wind- PV power plant. State their advantages

)4) Attempt any two: [16]

a) Discuss the role of NHPC in power development and present status of hydroelectric power generation in India.

b) Explain with neat sketch the pumped storage power plant.

c) Explain the working of power grid for smooth transmission of power from power stations to end user.

)5) a) Solve the following: [12]

A load duration curve of a system is a straight line, the maximum and minimum loads being 100 MW and 20 MW respectively. The load is supplied by base load and peak load plants.

The cost of both is given as :

For base load plant: Rs. 200/kW-year + Rs. 0.05/kWh

For peak load plant: Rs. 50/kW-year + Rs. 0.10/kWh

For minimum overall cost

i) Draw the load duration curve.

ii) Determine the load shared by peak load plant.

iii) Annual load factors for both stations.

b) Solve any one: [8]

i) Explain various tariff methods.

ii) Describe with neat sketch measurement of smoke and dust in flue gases.

)6) Write short notes on (Any two): [14]

a) Supply chain in power sector.

b) Human resource in power sector.

c) Energy audit.

EEE

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Total No. of Pages : 3

Seat No. | |

B.E. (Mech.) (Part - IV) (Semester - VIII) (Revised) Examination, May - 2018

ENERGY AND POWER ENGINEERING

Sub. Code: 68509

Day and Date : Monday, 07 - 05 - 2018 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumptions if required and state them clearly.**

Q1) a) Attempt any two: **[10]**

i) Define declination angle, hour angle and Zenith angle.

ii) Write procedure to test solar collector as per BIS standard?

iii) Draw a neat sketch of evacuated tube collector and analyse its use for different application.

b) Solve the following: **[8]**

Calculate the angle of incidence of beam radiation with normal to a flat plate collector, pointing the south location in Kolhapur (16°7'N,74°24'E) at 10.00 hours solar time on October 29. The collector is tilted at an angle of 35° with the horizontal. Also calculate day length.

Q2) Attempt any two: **[16]**

a) With the help of block diagram explain the operation of grid connected solar system for residence.

b) Explain the I-V characteristics of a solar cell and define fill factor. What is the significance of fill factor?

c) Explain the principle of operation of Phosphoric Acid Fuel Cell.

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Total No. of Pages : 2

Seat No.	

B.E. (Mechanical) (Part-IV) (Semester-VIII) (Revised) Examination, May - 2018

INDUSTRIAL AUTOMATION AND ROBOTICS (Elective-IV)

Sub. Code : 68518

Day and Date : Wednesday, 16 - 05 - 2018 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumption if necessary and mention them clearly.**

Q1) a) Explain the reasons used to justify the implantation of automation in industry. **[8]**

b) Explain the following advanced automation functions: **[8]**

i) Safety monitoring

ii) Error detection and recovery

iii) Maintenance and repair diagnostic

OR

b) Discuss with an appropriate example the concept of levels of automation. **[8]**

Q2) a) Analysis of a transfer line without storage buffers. **[8]**

b) Storage buffers in automated production systems. **[8]**

Q3) a) Explain the four automated assembly system configurations. **[8]**

OR

a) Explain following parts in assembly automation. **[8]**

i) Hoppers ii) Orientation mechanisms.

b) What are the hardware components of a workstation part delivery system? **[10]**

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Q4) a) Explain following terms with respect to robot - Spatial resolution, Load carrying capacity, Compliance, Precision of movement. **[8]**

OR

a) Explain the power transmission systems in robots. **[8]**

b) Explain the common robot configurations and their work volumes. **[8]**

Q5) a) Direct and inverse kinematics solutions in robotics. **[8]**

b) Explain the following gripper mechanisms: **[8]**

i) Magnetic grippers ii) Vacuum grippers

Q6) a) Explain a robot program as a path in space. **[8]**

b) Explain the two lead through programming methods in robot. **[10]**



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Total No. of Pages : 3

Seat No.	

T.E. Mechanical (Semester - V) Examination, April - 2018

CONTROL ENGINEERING

Sub. Code : 66241

Day and Date : Tuesday, 24 - 04 - 2018 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

Q1) a) For the mechanical system shown in figure la, construct grounded chair representation and find equation relating f & x. **[6]**

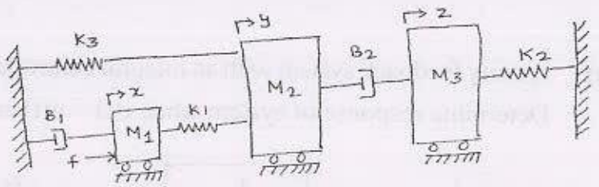


fig. 1 a

b) For the electrical circuit shown in figure 1b, construct mechanical system using direct analog. **[6]**

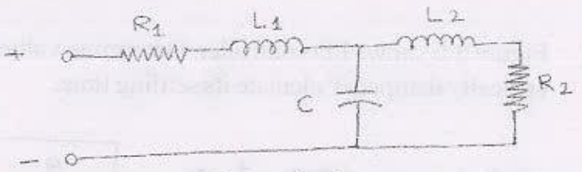


fig. 1 b

c) Obtain mathematical model of rotational system shown in figure 1c. **[6]**

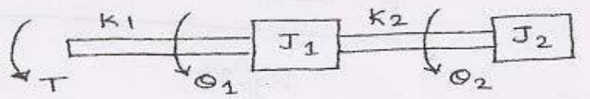


fig. 1 c

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2) a) Determine linear approximation for the equation used to find area of right angle triangle. Use this approximation to calculate approximate area when height (H) and base (B) of right angle triangle is 10 units and 5 units respectively. Take Hi = 12 and Bi = 4. **[8]**

b) Reduce the block shown in figure 2b and obtain transfer function. **[8]**

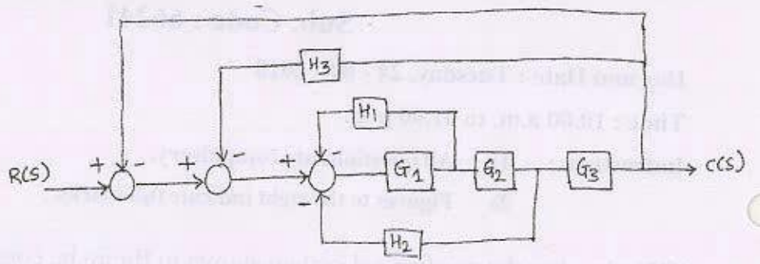


fig. 2b.

3) a) A unity feedback system with an integral controller is shown in figure 3a. Determine response of system when r(t) = u(t) and c(0) = $\dot{C}$ (0) = 0 **[8]**

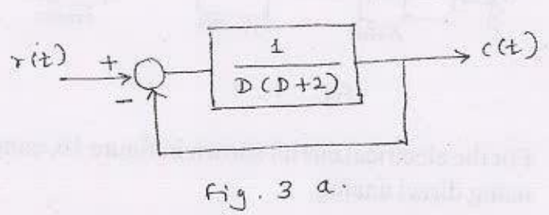


fig. 3 a.

b) Figure 3 b shows PD controller. Determine value of Td so that system is critically damped. Calculate its settling time. **[8]**

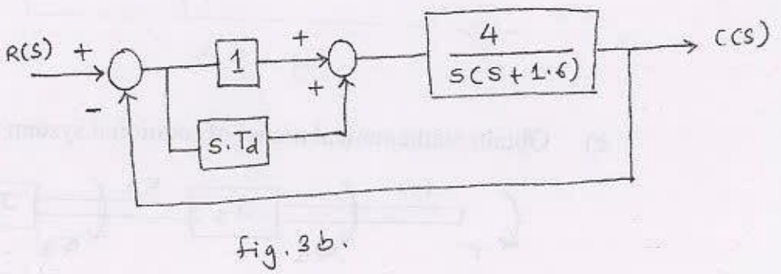


fig. 3b.

4) a) The characteristics equation of a feedback system is

$s^4 + 20s^3 + 15s^2 + 2s + k = 0$. Find value of k if **[6]**

i) System is marginally stable and

ii) System is in stable condition.

b) Obtain root locus for a unity feedback system with open loop transfer function

$$G(s)=\frac{k}{s\left(s^2+6s+25\right)}.$$ **[10]**

5) a) Determine value of k and α, so that unity feedback system oscillates at a frequency of 2 rad / sec. The system has open loop transfer function

$$G(s)=\frac{k(s+1)}{s^3+\alpha s^2+2s+1}$$ **[8]**

b) Draw Bode plot $G(s)=\frac{100(s+1)}{(s+10)(s+100)}$ **[10]**

6) a) A system is represented by $\frac{c(t)}{r(t)}=\frac{D+4}{D^2+4D+3}$, construct computer diagram and state space representation using direct programming. **[8]**

b) Obtain state space representation and computer diagram using parallel programming for the system having transfer function **[8]**

$$\frac{c(t)}{r(t)}=\frac{D+5}{(D+1)(D+2)(D+3)}$$

) a) Explain the concept of Equivalent Length and slenderness ratio of the column. Discuss the limitation of the Euler's Formula. [8]

b) A tension bar 5 m long (Fig. 5) is made up of two parts, 3m of its length has a cross sectional area of 10 cm^2 while the remaining 2 m has an cross sectional area of 20 cm^2. An axial load of 80 kN is gradually applied. Find the total strain energy produced in the bar of the same length and having the same volume when under the same load. Take $E = 2 \times 10^5$ N/mm^2. [8]

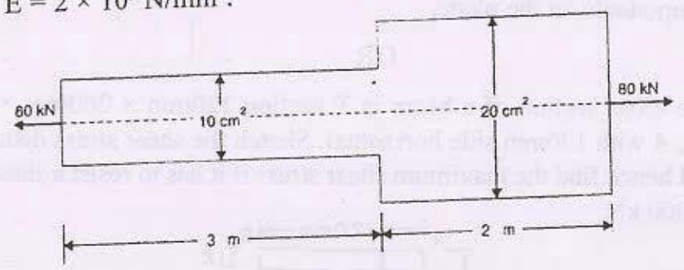


Fig. 5

EEE

Total No. of Pages : 4

Seat No.

S.E. (Mechanical) (Semester - IV) Examination, May - 2018

ANALYSIS OF MECHANICAL ELEMENTS

Sub. Code: 63361

)ay and Date : Monday, 07 - 05 - 2018 Total Marks : 100

'ime :10.00 a.m. to 1.00 p.m.

nstructions :
1) All questions are compulsory.
2) Assume suitable data wherever necessary and state it clearly.
3) Figures to the right indicate full marks.
4) Draw neat and labeled sketches wherever necessary.
5) Use of non programmable calculator is allowed.

)1) a) Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 50 cm apart as shown in Fig. 1. Diameters and lengths of each rod are 2 cm and 4 m respectively. A cross a bar fixed to the rods at the lower ends carries a load of 5000 N such that the cross bar remains horizontal even after loading. Find the stress in each rod and the position of the load on the bar. Take E for steel = 2×10^5 N/mm^2 and E for copper 1×10^5 N/mm^2. [12]

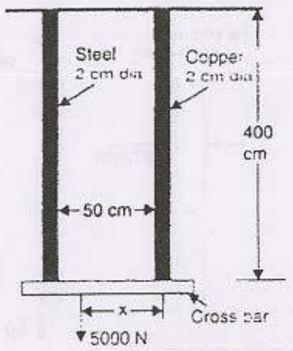


Fig. 1

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b) Explain the stress strain curve for ductile and brittle material with the help of neat sketch. [6]

OR

b) Find the angle of twist per meter length of hollow shaft of 100 mm external and 60 mm internal diameter. If the shear stress is not to exceed 35 N/mm². Take modulus of rigidity as 85 × 10³ N/mm². [6]

Q2) Draw SFD and BMD for loading condition shown in fig 2. Locate point of inflection if any. **[16]**

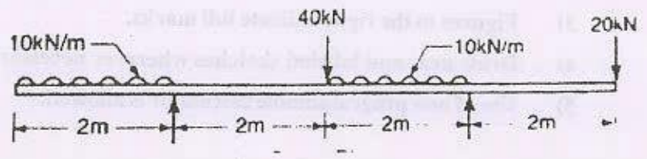


Fig. 2

Q3) The tension flange of a cast iron I section beam is 240 mm wide and 50 mm deep, the compression flange is 100 mm wide and 20 mm deep whereas web is 300 mm × 30 mm as shown in fig. 3. Find the load per meter run which can be carried over a 4m span by a simply supported beam, if the maximum permissible stresses are 90 N/mm² in compression and 24 N/mm² in tension. **[16]**

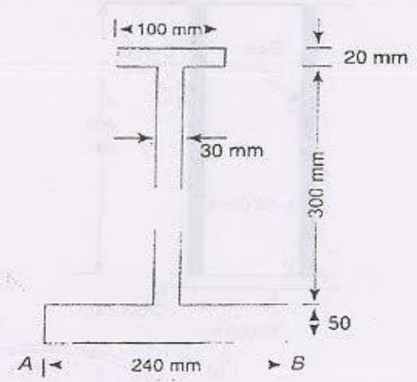


Fig. 3

Q4) a) Derive the expression for the principal stresses and the maximum shear stress for a member subjected to like direct stresses in mutually prependicular directions. Show the locations of Principal Planes and Planes of Maximum shear stress. **[9]**

b) The stresses on the two perpendicular planes through a point are 120 MPa (tensile), 80 MPa (Compressive), 60 MPa (Shear). Determine the normal and shear stress components on a plane at 60° to that of the 120 MPa stress and also the resultant and its inclination with normal components on the plane. **[9]**

OR

b) The cross section of a beam is T section 120mm × 200mm × 12mm Fig. 4 with 120mm side horizontal. Sketch the shear stress distribution and hence find the maximum shear stress if it has to resist a shear force of 200 kN. **[9]**

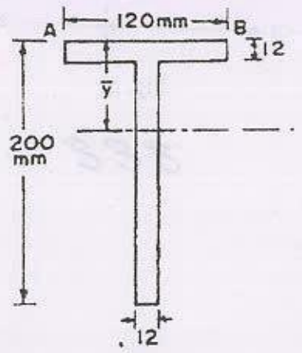


Fig.4

Q5) a) Derive the expression for slope and deflection of a cantilever subjected to uniformly distributed load (UDL) over whole length using double integration method. **[8]**

b) A cantilever beam of span 4 m carries a point load of 20 kN at a distance of 3 m from the fixed end. Determine, by moment area method the slope and deflection at the free end of the cantilever Assume EI = 9×10¹² N mm². **[8]**

OR

b) State the importance of theories of failure and explain the maximum strain energy theory. **[8]**

c) An axial flow compressor having eight stages with 50% reaction design compresses air in the pressure ratio of 4:1. The air enters the compressor at 20°C and flows at a constant speed of 90 m/s. The rotating blades of compressor rotate with a mean speed of 180 m/s. Isentropic efficiency of the compressor taken as 82%. Calculate,

i) Work done by machine

ii) Blade angles

Take $\gamma = 1.4$ and $c_p = 1.005$ kJ/kg K. **[8]**

Q6) a) Compare gas turbine with reheating and intercooling. **[8]**

d) A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610°C. The isentropic efficiencies of the compressor and turbine are 80% and 82% respectively. Calculate the power output in kW of an electric generator geared to the turbine when air enters the compressor at 15°C at the rate of 16 kg/s.

Take $\gamma = 1.4$ and $c_p = 1.005$ kJ/kg K for the compression process and $\gamma = 1.333$ and cp = 1.11 kJ/kg K for the expansion process. **[8]**

OR

c) In an oil-gas turbine installation, it is taken at pressure of 1 bar and 27°C and compressed to a pressure of 4 bar. The oil with calorific value of 42000 kJ/kg is burnt in the combustion chamber to raise the temperature of air 550°C. If the air flows at the rate of 1.2 kg/s, find the net power of installation and air fuel ratio. **[8]**

Take $c_p = 1.05$ kJ/kg K and $c_v = 0.714$ kJ/kg K.

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Total No. of Pages : 4

Seat No.

S.E. (Mechanical Engineering) (Part - II) (Semester - IV) (Revised) Examination, May - 2018
FLUID AND TURBO MACHINERY
Sub. Code: 63362

Day and Date : Friday, 11 - 05 - 2018 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right side indicate full marks.**
3) **Assume suitable data, if necessary and indicate clearly.**
4) **Use non programmable calcualtor is allowed.**

Q1) a) Explain different efficiencies of hydraulic turbine. **[8]**

b) A Pelton wheel is to be designed for following specifications **[8]**

i) Shaft Power = 13250 kW

ii) Head = 800 m

iii) Speed = 600 rpm

iv) Peripheral velocity = $0.46\sqrt{2gH}$

v) Overall efficiency = 85%

vi) The diameter of the jet is not exceeding one sixteenth the wheel diameter.

Take coefficient of velocity 0.97 and determine,

1) Discharge through turbine
2) Diameter of wheel
3) Diameter of jet
4) Number of jet required

OR

c) A Pelton wheel is revolving at a speed of 190 rpm and develops 5150.25 kW when working under head of 220 m with an overall efficiency of 80%. The speed ratio for turbine is given as 0.47. Determine unit speed, unit discharge and unit power. Also find speed when this turbine is working under a head of 140 m. **[8]**

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Q2) a) State working principle of Reaction turbine and explain working of any one reaction turbine. **[8]**

b) A Francis turbine with overall efficiency of 75% is required to produce 148.25 kW power. It is working under a head of 7.62 m. The peripheral velocity = $0.26\sqrt{2gH}$ and radial velocity of flow at inlet is $0.96\sqrt{2gH}$. The wheels runs at 150 rpm and hydraulic losses in turbine are 22% of available energy. Assuming radial discharge. **[8]**

Derermine:

i) Guide blade angle,

ii) Wheel vane angle,

iii) Diameter of wheel,

iv) Width of wheel at inlet.

OR

c) A conical draft tube having diameter at the top as 2 m and pressure head of 7 m of water (vacuum), discharges water at the outlet with a velocity of 1.2 m/s at the rate of 25 m^3/s. If atmospheric pressure head is 10.3 m of water and losses between the inlet and outlet of the draft tube are negligible, find the length of draft tube immersed in water. Total lenght of tube is 5m. **[8]**

Q3) a) Explain construction of centrifugal pump and define different heads available for pump. **[8]**

b) Write a short note (any two): **[10]**

i) Explain multistage of pump.

ii) What is Cavitation and also comments on effects, precaution

iii) Explain performance curves of pump.

OR

c) Solve following problems. **[10]**

i) A centrifugal pump is used to discharge 0.118 m^3/s of water at a speed of 1450 rpm against a head of 25m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75%. Determine the vane angle at outer periphery of impeller.

ii) Find the number of pumps required to take water from a deep well under a total head of 89m. All pumps are identical and are running at 800 rpm. The specific speed of each pump is given as 25 rpm while the rated capacity of each pump is 0.16 m^3/s.

Q4) a) Why the clearance volume is provided in reciprocating air compressor. Explain its effect on the work required to drive the compressor. **[8]**

b) Write a short note (any two): **[10]**

i) Explain root blower and vane blower compressor.

ii) Different efficiencies of reciprocating air compressor.

ii) Different applications of compressed air.

OR

c) Solve following problems. **[10]**

i) A two stage single acting reciprocating air compressor draws in air at a pressure of 1 bar and 17°C and compresses it to a pressure of 60 bar. After compression in the low pressure cylinder, the air is cooled at constant pressure of 8 bar to a temperature of 37°C. The low pressure cylinder has a diameter of 150 mm and both cylinders have 200 mm stroke. If law of compression is $PV^{135} =$ constant, find the power of the compressor, when it runs at 200 rpm. Take R = 287 J/kg K.

ii) A single stage reciprocating air compressor takes in 7.5 m^3/min of air at 1 bar and 30°C and delivers it at 5 bar. The clearance is 5 percent of the stroke. The expansion and compression follows $PV^{13} =$ constant. Calculate Temperature of delivered air volumetric efficiency & power of the compressor.

Q5) a) Explain terms Surging, Chocking, and Stalling for centrigual air compressor. **[8]**

b) A centrifugal compressor running at 10000 rpm delivers 660 m^3/min of free air. The air is compressed from 1 bar and 20°C to pressure ratio of 4 with isentropic efficiency of 82%. Blades are radial at outlet of impeller and flow velocity of 62 m/s may be assumed throughout constant. The outer radius of impeller is twice the inner and the slip factor may be assumed as 0.9. The blade area co-efficient may be assumed 0.9 at inlet. Calculate:

i) Theoretical power

ii) Impeller diameters at inlet and outlet. Also find breadth of impeller at inlet. **[8]**

OR

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised)

Examination, May - 2018

THEORY OF MACHINES - I

Sub. Code: 63363

Day and Date : Monday, 14 - 05 - 2018 **Total Marks : 100**

Time :9.30 a.m. to 1.30 p.m.

Instructions :
1) Attempt all questions.
2) Figures to the right indicate full marks.
3) Draw neat labeled sketch wherever necessary.
4) Assume suitable data, if necessary and state clearly.
5) Use of non-programmable calculator is allowed.

Q1) a) Write a note on different types of kinematic pairs with the help of neat sketches. **[8]**

OR

A Hooke's joint connects two shafts having an angle of 15° between them. The driving shaft rotates at 1200 r.p.m. The driven shaft has a flywheel of mass 7 kg and radius of gyration 90 mm. Find the maximum angular acceleration of the driven shaft and the maximum torque required. **[8]**

b) A four bar mechanism is as shown in fig. 1. b. Lengths of various links are: OA = 225 mm, AB = 375 mm, BC = 350 mm and OC = 650 mm. Crank OA rotates at 320 r.p.m. Locate all the instantaneous centres and find: **[8]**

i) velocity of B and

ii) angular velocities of AB and BC.

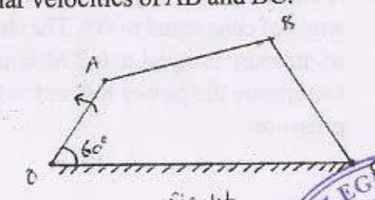


fig. 1.b

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Q2) The dimensions of the various links of a mechanism shown in fig. 2 are: OA = 30 mm, AB = 80 mm, BC = 45 mm and BD = 120 mm. **[18]**

The crank OA rotates uniformly in clockwise direction at 120 r.p.m. For the given configuration, find

a) velocity of D,

b) acceleration of D and

c) angular acceleration of link BD.

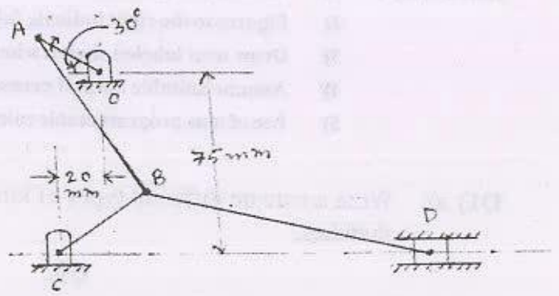


fig. 2

Q3)a) Derive the equation for friction torque in case of flat collar pivot bearing assuming the condition of uniform pressure. **[8]**

OR

Derive the equation for friction torque in case of conical pivot bearing assuming uniform wear with usual notations. **[8]**

b) A conical pivot supports a shaft having an axial load of 15 kN and has an angle of cone equal to 90°. The shaft is rotating at 150 r.p.m. The intensity of pressure is equal to 0.3 MN/m² and the coefficient of friction is 0.05. Determine the power lost in friction assuming the condition of uniform pressure. **[8]**

Q4) a) With neat sketches write classification of followers. **[4]**

b) Construct the cam profile for the following specifications;

Least radius of cam = 25 mm; Diameter of roller = 25 mm; Angle of rise 120°; Angle of fall = 150°; Angle of dwell in between = 45°; Lift of follower = 40 mm;

During the lift follower moves with SHM and during the fall it moves with uniform acceleration and deceleration. The line of stroke of follower is off set by 12.5 mm towards right of centre of cam. **[14]**

Q5) a) Explain law of belting: **[6]**

OR

Explain initial tension in belt drive. **[6]**

b) An open belt drive connects two pulleys 1200 mm and 500 mm diameters, on parallel shafts 4 m apart. The maximum tension in the belt is 1855.3 N. The coefficient of friction is 0.3. The driver pulley of 1200 mm diameter rotates at 200 rpm. Calculate the power transmitted by the drive and torque on each pulley. **[10]**

Q6) a) Derive the equation for relation between speed and height of Porter governor. **[6]**

OR

Explain effort and power of governor. **[6]**

b) In a spring loaded Hartnell governor, the extreme radii of rotation of balls are 80 mm and 120 mm. The weight arm and sleeve arm of bell crank lever are equal in length. Mass of each ball is 2 kg. The speeds at the two extreme positions are 400 and 420 rpm. Determine spring stiffness and initial compression of spring. Neglet the sleeve mass. **[10]**

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part-II) (Semester-IV) (Revised) Examination, May - 2018

MACHINE TOOLS AND PROCESSES

Sub. Code : 63364

Day and Date : Wednesday, 16 - 05 - 2018 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**
4) **Use of Non-programmable Scientific Calculator is allowed.**

Q1) Attempt any four (4 marks each):

a) Explain the properties of core sand. Suggest the methods to measure the same. **[4]**

b) Briefly explain the function of runners and gates in the gating system. **[4]**

c) What are the steps involved in pressure die casting. **[4]**

d) Draw neat sketch of arc furnace and label all the parts. **[4]**

e) State the defects related to melting process? Explain any two of them. **[4]**

Q2) Attempt any four (4 marks each):

a) How does cold rolling differ from hot rolling in terms of the process and product? **[4]**

b) List the different stages in drop forging process in production of a component such as spanner. **[4]**

c) Show by schematic sketches the process of forward extrusion. Give two examples of components produced by extrusion. **[4]**

d) What is the difference between a wire drawing operation and extrusion? **[4]**

e) Why is the strength of rolled part is better that a cast piece. **[4]**

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Q3) Write a short note on (Any Three):

a) Advantages and limitations of centrifugal casting process. **[6]**

b) Defects in extrusion. **[6]**

c) Blow molding. **[6]**

d) Calendaring process for plastic. **[6]**

Q4) Attempt any four (4 marks each):

a) Calculate the gear train for cutting following threads on a lathe having lead screw 4 TPI.

i) 6 TPI

The lathe is supplied with a change gear set from 20 to 120 teeth in steps of 5 teeth and an additional gear of 127 teeth. **[4]**

b) Describe the various work holding devices used on turret lathe. **[4]**

c) Discuss in brief methods of classification of boring machines. **[4]**

d) Draw a neat sketch of radial drilling machine and label all the parts. **[4]**

e) Where would you propose use of face plate on a lathe? Justify your answer. **[4]**

Q5) Attempt any four (4 marks each):

a) What is meant by the term 'speed' & 'feed' of a planer. **[4]**

b) Explain with neat sketch working principle of shaper. **[4]**

c) Describe the function of any four parts of milling machines. **[4]**

d) Sketch and describe the following operations on milling machine: **[4]**

i) Angular milling.

ii) Keyway milling.

e) Which method of manufacturing of a gear is best suitable for helical gears? Give reasons. **[4]**

Q6) Write a short note on (Any Three):

a) Various operations performed on drilling machine. **[6]**

b) Electrical Discharge machining advantages and limitations. **[6]**

c) Applications of Laser beam machining process with sketch. **[6]**

d) Ultrasonic machining process. **[6]**

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SV-78

Total No. of Pages : 3

Seat No.

S.E. (Mechanical Engineering) (Semester - IV)
Examination, May - 2018
APPLIED NUMERICAL METHODS
Sub. Code : 63360

Day and Date : Friday, 04 - 05 - 2018 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Make suitable assumptions/data if required and state clearly.**
3) **Draw neat sketches wherever necessary.**
4) **Figures to the right indicate full marks.**
5) **Use of calculator is allowed.**

Q1) a) Explain the different types of errors in numerical computations. **[4]**

b) Solve any two : **[2×6=12]**

i) Use bisection method to find the root correct to three decimal places of $f(x)=x^3-4x-8.95=0$.

ii) Using Newton's iterative method, find the real root of $x\log_{10}x=1.2$ correct to five decimal places.

iii) Use Muller's method to find a root of the equation $x^3-3x-7=0$, which lies between 2 and 3.

Q2) Solve any two : **[2×8=16]**

a) Solve the following equations by Gauss-Jordon method

$3x+4y+5z=18$

$2x-y+8z=13$

$5x-y+7z=20$

b) Solve the system of equations using LU Decomposition.

$3x+2y+7z=4$

$2x+3y+z=5$

$3x+4y+z=7$

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c) Solve the following equations by Gauss-Jacobi method.

$15x+3y-2z=85$

$2x+10y+z=51$

$x-2y+8z=5$

Q3) a) Fit a polynomial of the second degree for the following data : [6]

x:	0	1	2	3	4
y:	1	0	3	10	21

Hence find y at $x=2.5$

b) Derive the equation of the interpolating polynomial by Newton's divided difference table for the following data : [6]

x:	0	1	2	3	4	5
y:	3	2	7	24	59	118

c) Calculate the mean and standard deviation for the following data: [6]

Size of item:	6	7	8	9	10	11	12
Frequency:	3	6	9	13	8	5	4

Q4) Solve any two : [2×8=16]

a) A slider in a machine moves along a fixed straight rod. Its distance (m) along the rod are given in the table for various values of time (sec). Find the velocity and acceleration of slider at t=0.3 seconds.

t(sec):	0	0.1	0.2	0.3	0.4	0.5	0.6
x(m):	30.13	31.62	32.87	33.64	33.95	33.81	33.24

b) Evaluate $\int_4^{5.2} \ln x\,dx$ using trapezoidal and Simpson's 1/3rd rule n=6.

c) Use Romberg's method to evaluate $\int_0^{\pi} \sin x\,dx$.

Q5) Solve any two : [2×8=16]

a) Compute $y(0.2)$ correct to four decimal places, for $\frac{dy}{dx}+y+xy^2=0$ with $y(0)=1$, take $h=0.1$. Use RungeKutta fourth order method.

b) Given the boundary value problem $\frac{d^2y}{dx^2}=6x+4$ $y(0)=2$, $y(1)=5$ obtain its solution in the range $0\le x\le 1$ with $h=0.25$ using Finite Difference method.

c) Solve the equation $\frac{dy}{dx}=x+y$. Given $y(0)=1$. Obtain the values of $y(0.1)$, $y(0.2)$ using Picard's method.

Q6) a) Classify the following partial differential equations : [6]

i) $\frac{\partial^2 y}{\partial t^2}=\alpha^2\frac{\partial^2 y}{\partial x^2}$

ii) $xU_{xx}+yU_{yy}+4y^2U_x=0$

iii) $\frac{\partial u}{\partial t}=k\frac{\partial^2 u}{\partial x^2}$

b) Solve $U_{xx}+U_{yy}=0$ in the square mesh of side 4 units satisfying the following conditions. [12]

i) $u(0,y)=0$ for $0\le y\le 4$

ii) $u(4,y)=12+y$ for $0\le y\le 4$

iii) $u(x,0)=3x$ for $0\le x\le 4$

iv) $u(x,4)=x^2$ for $0\le x\le 4$

Perform two iterations

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VII) (Old)

Examination, November - 2017

EARTHQUAKE ENGINEERING

Sub. Code: 47903

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :

1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data whenever necessary.**
4) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION-I

Q1) a) What are causes of earthquake? Explain in brief plate tectonic theory. **[8]**

b) Classify and describe with suitable sketches, different types of seismic waves generated by an earthquake. **[8]**

Q2) a) Define Logarithmic decrement, how it is measured and derive the equation of Logarithmic decrement. **[7]**

b) The building frame shown in the Fig.1 is given a 100 mm lateral displacement and released from the rest to vibrate freely. Find the logrithmatic decrement and displacement of the system afte 12 cycles and comments on the result. Consider 10% damping. Take $EI_{column} = 1.1 \times 10^{12}$Nmm. **[9]**

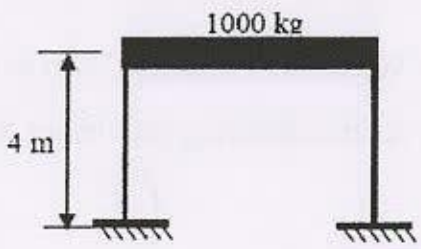


Fig. 1

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Q3) a) Explain in details Force Transmission Ratio. **[05]**

b) A SDOF system consists fo 5 m high column of 600 mm diameter which supports the heavy mass of 10500 kg at its top. The system is subjected to a harmonic force of 1800 sin50t N. Consider 20% damping and E = 2×10^5. Calculate the maximum dynamic amplitude and also state whether the system will have resonance or not? **[11]**

Q4) Calculate the base shear for a five storey hospital building having special moment resisting frame (SMRF) located in Pune on medium soil with following data using seismic coefficient method. **[18]**

a) No. of bay in x and y-direction = 4

b) Width of each bay = 5m

c) Thickness of slab = 150 mm

d) Storey height = 3.2 m

e) Size of beam and column = 300 mm × 450 mm

f) Amount of damping = 5% of critical damping

g) Live load = 4kN/m^2

Assume any additional data if required and neglect the weight of the infill wall panels.

SECTION-II

Q5) a) Explain earthquake design philosophy for building. **[8]**

b) Explain soft storey? Explain how soft storey probelms can be eliminated in the existing buildings. **[8]**

Q6) a) Explain how "ductility of building" can be effectively designed. **[8]**

b) What are the ductile detailing provisions for column? Explain with neat sketches. **[8]**

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Q7) a) What points should be kept in mind while designing earthquake resistant brick masonry structure? **[8]**

b) Discuss in detail the advantage of horizontal bands and vertical reinforcement in the masonry buildings. **[8]**

Q8) Write a short note (Any three): **[18]**

a) Stud Wall Construction.

b) Strong column and weak beam.

c) Effect of soft storey of RC structure.

d) Jacketing of column.

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Seat No.	

Total No. of Pages : 2

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

SOLID WASTE MANAGEMENT (Elective-I)

Sub. Code : 67569

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any two of the following: **[2×8=16]**

a) What is Solid Waste and Solid Waste Management? Write the objectives of SWM.

b) State the composition of MSW. Describe the compositions.

c) Write note on Biomedical Waste Management.

Q2) Answer any two of the following: **[2×9=18]**

a) Explain with the help of flow diagram, the functional elements of Municipal Solid Waste Management.

b) Explain the methods of solid waste collection with a neat sketch.

c) Explain in detail with help of figure the different types of Transfer Station.

Q3) Answer any two of the following: **[2×8=16]**

a) List out the different equipment used for processing solid waste and explain any one with neat sketch.

b) What is MRF? Explain the processes for MSW at these facilities with flow diagram.

c) Explain with the figure the different types of air classifiers methods.

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SECTION-II

Q4) Answer any two of the following: **[2×9=18]**

a) What is Sanitary landfilling? Write the site selection criteria for sanitary landfilling.

b) Draw the cross section of sanitary landfill and explain the essential components.

c) Identify the adverse effects of a landfill leachate and its appropriate control measures.

Q5) Answer any two of the following: **[2×8=16]**

a) What is composting? Explain composting process of bio degradable MSW.

b) Explain mechanical composting plant with flow diagram.

c) Explain the different factors affecting composting.

Q6) Answer any two of the following: **[2×8=16]**

a) Explain the working of an incinerator with a neat sketch.

b) Write the air pollution problem associated with incineration system and its control techniques.

c) Describe pyrolysis and its products.

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Total No. of Pages : 2

Seat No.	

B.E. (Civil) (Semester-VII) Examination, November - 2017
GROUND IMPROVEMENT TECHNIQUES (Elective-I)
Sub. Code : 67571

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Que. No. 1 from section-I and Que. No. 5 from section-II are compulsory.**
2) **Solve any two other questions from each of the section.**
3) **Figures to the right indicates full marks.**

SECTION-I

Q1) Answer the following: **[4×5=20]**

a) Explain the various types of vertical drains used in ground improvement.

b) What is mean by dynamic consolidation.

c) Explain use of stone column as ground improvement method.

d) Enlist various ground improvement technique according to their suitability.

Q2) a) How do vertical drains improve the functioning of pre-loading? Explain with neat sketch. **[8]**

b) Explain various components of ground Anchor. **[7]**

Q3) a) Explain design procedure of stone column. **[8]**

b) Explain construction sequence of soil nailing. **[7]**

Q4) Write a short note on **[3×5]**

a) Classification of ground improvement technique

b) Soil nailing

c) Rock Anchor in grannuar soil

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SECTION-II

Q5) Answer the following: **[4×5=20]**

a) Enlist various factor affecting the soil stabilization.

b) Explain the earth reinforcement mechanism.

c) Write down the various application of earth reinforcement.

d) Enlist different types of geosynthetics.

Q6) a) Compare and enlist the various method of soil stabilization. **[8]**

b) Explain the various application of geosynthetics with respect to

i) reinforcement ii) separator

iii) filter iv) drainage **[7]**

Q7) a) Explain the stress-strain relationship of reinforced soil. **[8]**

b) Explain the various types of grout used in ground improvement. **[7]**

Q8) Write a short note on: **[5×3]**

a) Function of geosynthetics

b) Fly-ash soil stabilization

c) Selection of geosynthetics



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Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Part - IV) (Semester - VIII)
Examination, November - 2017
DESIGN OF CONCRETE STRUCTURES - II
Sub. Code : 67748

Day and Date : Wednesday, 1 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary and mention it clearly.**
4) **Use of non programmable calculator is allowed.**
5) **Use of relevant IS Codes are allowed.**

SECTION - I

Q1) Design rectangular beam for limit state of collapse in torsion for following data. **[16]**

Size of beam = 400 × 700mm, over all

Factored Shear force = 95 KN

Factored Bending moment = 180 KN.m

Factored Torsion Moment = 55 KN.m

Effective cover = 50mm

Use M20 and Fe 415

Q2) A RCC beam ABCD spanning over four supports carries a live load of 12KN/m and dead load from walls 300mm, 2.8 high. If M20 grade concrete and Fe 415 grade steel is to be used. Design the continuous beam using IS-456 - 2000 provision. Span AB = BC = CD = 6m Take unit weight brick wall 19KN/m^3. Draw a sketch showing reinforcement details. **[16]**

Q3) Design a square water tank resting on ground having dimensions 4m × 4m and height of water is 3m. Assume free board of 0.2m. Use M20 and Fe 415 grades. **[16]**

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Q4) a) Write a note on balanced, under reinforced and over reinforced section as per WSM. **[9]**

b) Explain the concept of moment of redistribution. **[9]**

SECTION - II

Q5) a) Explain in details three concepts of pre-stress concrete section in analysis. **[8]**

b) Explain systems of pre-stressing with figures. **[8]**

Q6) A pre-stressed concrete beam of rectangular section 300mm × 600mm has a span of 10m. The effective pre-stressing force is 980KN at constant eccentricity of 120mm. The dead load of beam is 4.5KN/m and the beam has to carry a live load of 7.5KN/m **[16]**

Determine the extreme stresses,

a) At the end section

b) At the midsection without action of live load

c) At mid section with action of live load.

Q7) A post tensioned pre-stressed concrete beam of 16m span is subjected to an initial pre-stress of 1458KN. The profile of the cable is parabolic with the maximum eccentricity of 520mm at the center of span. **[16]**

$A = 2.42 \times 10^5 mm^2$, $I = 5.30 \times 10^{10} mm^4$, $As = 1386 mm^2$,

$Es = 2.1 \times 10^5 N/mm^2$, $Ec = 3.82 \times 10^4 N/mm^2$

$\mu = 0.25$, $k = 0.0015/m$, anchorage slip = 2.5mm, creep coefficient = 1.5, $\alpha = 0.13$

Determine the following losses in pre-stress,

a) Elastic shortening.

b) Shrinkage in concrete.

c) Creep in concrete.

d) Slip in anchorage.

e) Frictional loss.

Q8) Design a pre-tensioned concrete rectangular section for the following details

Effective span of beam = 12m.

Live load of intensity = 30 KN/m.

Concrete grade = M 35

Ultimate stresses tendon = 1450 N/mm^2

Loss of pre-stress = 20%

Assume Safe stress is 0.6 times Ultimate stress in tendon.

Permissible stress in concrete at transfer stage is 0.5 σ_{CK}

Permissible stress in concrete at working stage is 0.4 σ_{CK}

Permissible tensile stress in concrete at transfer and working stage is 1.2 N/mm^2 **[18]**

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VIII)
Examination, November - 2017
STRUCTURAL DESIGN OF FOUNDATION AND RETAINING STRUCTURES (Elective - II)
Sub. Code: 67753

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any two questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Use of IS 456- 2000 is allowed.**
4) **Assume suitable data if necessary and mention it clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Two columns A and B 5 m apart between centres carry loads 840 kN and 1200 kN. Design a 2 m wide combined rectangular footing for the columns. The footing shall consist of a central longitudinal beam with cantilevering slabs on either side. Each column is 400 mm × 400mm. The safe bearing capacity of soil is 150 kN/m^2. Use M 20 grade concrete and Fe 415 steel.**[25]**

Q2) A column carrying a load of 2500 kN has to be supported on 4 piles each of size 300 mm × 300 mm. The piles are spaced at 1.00 m centres as shown in figure.1. The column size is 600 mm × 600 mm. Design the pile cap. Use M 20 grade concrete and Fe 415 steel. **[25]**

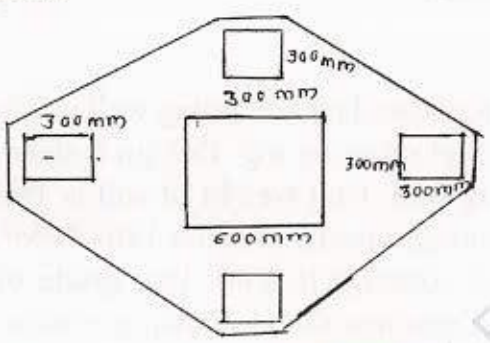


Fig. 1

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Q3) Design a suitable continuous raft foundation connecting the columns of a building 12 m × 12 m shown in figure to suit the following data. **[25]**

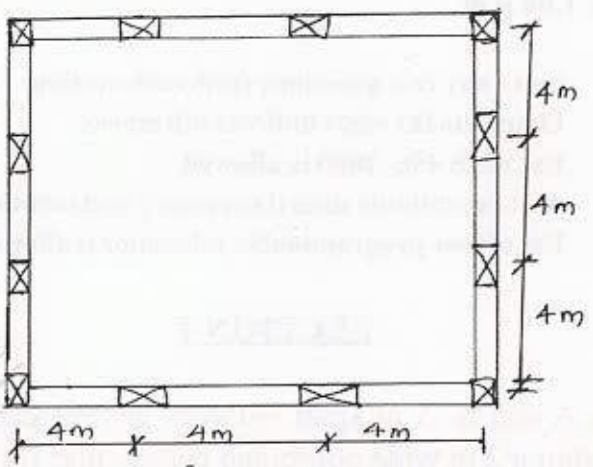
a) Spacing of column = 4 m C/C

b) Service load transmitted = 500 kN on each column.

c) Size of column = 300 mm × 300 mm.

d) Safe bearing capacity = 150 kN/m^2.

e) M 20 concrete and Fe 415 steel.



figure

SECTION-II

Q4) a) Draw neat sketch of well foundation and explain function of each component part in detail. **[12]**

b) Enlist different types of well foundation explain each in detail wiht neat sketch. **[13]**

Q5) A steam of cantilever retaining wall is 3.8m tall, The cantilever retaining wall retains soil up to its top. Design a steam, toe and heel slab of a cantilever retaining wall. Unit weight of soil is 19KN/M^3. The angle of repose is 30°. Safe bearing capacity of soil is 180KN/M^2. The coefficient of friction between soil and concrete is 0.60. Use grade of concrete M_{20} and grade of steel Fe 415. Draw neat sketch showing reinforcement details of cantilever retaining wall. **[25]**

Q6) a) Explain breakwater and its application? Draw a neat sketch and explain vertical wall break water. **[12]**

b) Design armor of rubble mound breakwater if depth of water is 17.0m. Wind velocity is 165Km/Hour. Fetch of wave is 260KM. Allowable bearing pressure on rock is 800KN/M^2. **[13]**

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b) Differentiate between free hold property and lease hold property. [5]

c) Write the significance of sinking fund and derive its expression. [5]

Q8) Write short note on (any three): [18]

a) Building lease and occupational lease.

b) Valuer and his duties.

c) Different types of values.

d) Arbitration.

EEE

Total No. of Pages :4

Seat No.	

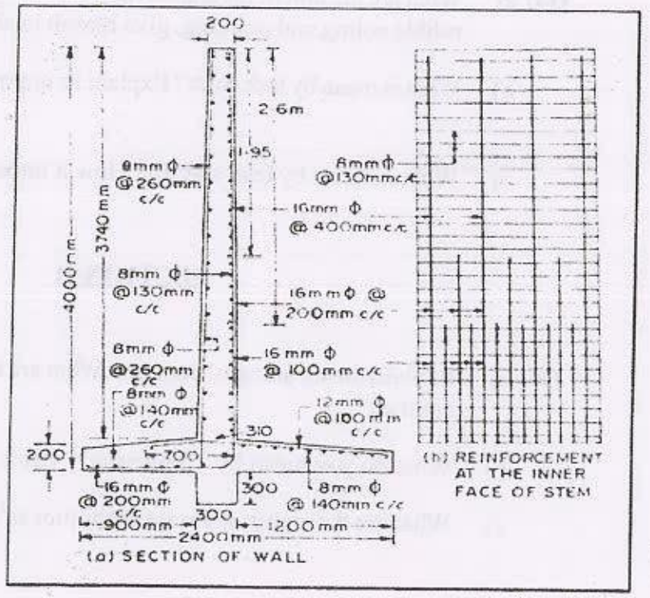
B.E. (Civil) (Semester - VII) (New Course)
Examination, November - 2017
QUANTITY SURVEYING & VALUATION
Sub. Code: 67560

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**
Time :2.30 p.m. to 6.30 p.m.

Instructions :
1) **Q.No. 1 is compulsory.**
2) **Attempt any two questions from remaining questions of section I.**
3) **Attempt any three questions from section II.**
4) **Assume any other additional data if required and state it clearly.**

SECTION-I

Q1) Work out the quantities of below retaining wall 50m in length as stated. **[20]**



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a) Calculate concrete quantity in standard format.

b) Prepare a BBS of given figure in standard format.

Q2) a) Write different types of estimate and state various items to be included in it. **[5]**

b) What is DSR? Prepare analysis of rate for a RCC isolated box footing of area 2.5Ssq.M, and 3.1Sq.M each for a concrete depth 350mm. **[10]**

Q3) a) Which are the various extra charges taken in to account for preparing detailed estimate and why? Explain in detail. **[8]**

b) Write unit of measurement of any three civil engineering items. Write mode of measurement for excavation and concrete. **[7]**

Q4) a) What are the unit of measurement for skirting, door handle, steel sections, rubble soling and pointing, give reason in short. **[5]**

b) What is mean by task work? Explain its importance with suitable example. **[5]**

c) What is mean by lead and lift? How it impacts the cost? **[5]**

SECTION-II

Q5) a) Explain the meaning of contract. What are the reasons of for rejection of contract? **[7]**

b) What do you mean by "Tendering"? Draft a sample tender notice. **[5]**

c) What are the rights and responsibilities of parties of contract. **[5]**

Q6) a) Explain valuation by development method. **[6]**

b) A plot shown in figure is to be valued according to the following details: **[10]**

i) Front width is 50m

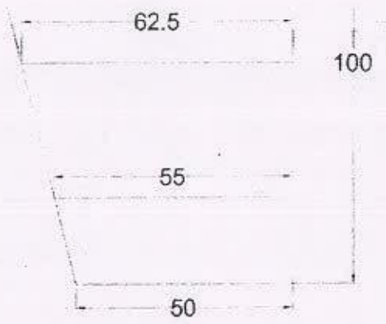
ii) Rear width is 75m

iii) Initial depth is 20m

iv) Market rate of land in the same locality is Rs. 375psm.

Use belting method of valuation.

75



Q7) a) A plate compactor was purchased at Rs. 80,000/-. Assume salvage value to be 10% after 8 years, Calculate depreciation for every year by following methods: **[6]**

i) Straight line method

ii) Constant percentage method.

SF-30

Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

PROJECT MANAGEMENT AND CONSTRUCTION EQUIPMENT

Sub. Code : 67561

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt any THREE questions from each Section.**
2) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain the role of various agencies involved in a construction project. **[8]**

b) A project consists of following activities with their duration in days. **[9]**

Activity	1-2	1-3	1-4	2-5	3-6	4-5	4-6	4-7	5-7	6-7
Duration (days)	6	3	4	0	4	12	10	8	5	6

Draw the network. Find out critical path and project duration.

Following conditions exists at the end of 10^{th} day,

i) Activities 1-2, 1-3, 1-4 have been completed as per schedule.

ii) Activities 4-5, 4-6, 3-6 are in progress and will require 6,6 and 1 more days for its completion, respectively.

iii) Other activities have not been started and their duration holds good except activity 5-7 which will require only 3 days instead of 5 days as planned originally.

Update the network.

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)2) a) Explain the concept of Normal and Beta Distribution in P.E.R.T. [8]

b) With the information given in the table draw the network for a construction project. Determine the critical path and its standard deviation. Find Probability of completion of project in 40 days. (For Z = 1.7, Pr. = 95.54%; For Z = 1.8, Pr. = 96.41%) [9]

Activity	Optimistic time	Most likely time	Pessimistic time
1-2	2	5	8
2-3	8	11	20
3-4	0	0	0
2-4	4	7	16
2-5	4	9	20
4-6	7	10	13
5-6	3	7	17
3-7	3	5	13
6-7	2	3	10
7-8	2	4	6

)3) a) Explain various safety equipment used on construction sites. [8]

b) What are the common risks on construction projects? How will you identify these risks? [9]

)4) Write notes on any FOUR. [16]

a) Objectives of Project Management.

b) Milestone Chart.

c) Resource Allocation.

d) Safety Policy.

e) Safety Training.

SECTION-II

)5) a) Explain the construction and operation of Bulldozer with neat sketch. [8]

b) Explain working of Scraper with neat sketch. [8]

)6) a) Explain the construction and working of 'Clamshell'. [8]

b) Enlist various types of compacting equipment. Explain any ONE with sketch. [9]

)7) a) Explain the 'safety measures' in blasting operations. [8]

b) Explain in detail 'Well Point System' of dewatering with neat sketches. [9]

)8) Write notes on any FOUR. [16]

a) Mechanical v/s Manual Construction.

b) Use of Tractors in construction.

c) Tippers.

d) Detonators.

e) Necessity of drainage in excavations.

✡ ✡ ✡

SF-28

Total No. of Pages : 3

Seat No.	

B.E. (Civil Engineering) (Semester - VII)
Examination, November - 2017
EARTHQUAKE ENGINEERING (New)
Sub. Code : 67559

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Assume any suitable data whenever necessary.**
3) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION - I

Q1) a) What is mean by plate boundaries? Explain in details. **[8]**

b) Classify ad describe with suitable sketches, different types of waves generated by an earthquake? **[8]**

Q2) a) Derive the equation of motion and its solution for free damped vibration system. **[8]**

b) Find the natural frequency and natural period for the building frame shown in the fig. 1. During test the frame is given 40 mm initial lateral displacement and released from the rest to vibrate freely. Find the displacement after 4 seconds and number of cycles when amplitude reduced to 1/20 of maximum.Consider 10% damping. Take $EI_{Column} = 1.5 \times 10^{12}$ N.mm^2, $EI_{Beam} = \infty$. **[10]**

OR

b) A SDOF system consists of 5 m high column of 450 mm diameter which supports the heavy mass of 20 tonne at its top. The system is subjected to a harmonic force of 200 Sin 40t kN. Consider 20% damping & $E = 2.1 \times 10^5$ N/mm^2. Calculate the maximum dynamic amplitude. Also, state whether system will have resonance or not? **[10]**

P.T.O.

Q3) Calculate base shear in the critical direction only for BSNL office in Pune with following data by seismic coefficient method. **[16]**

a) No. of storey = 4

b) No. of bay in x direction = 3

c) No. of bay in y direction = 1

d) storey height = 3 m

e) Width of each bay = 5 m

f) Total DL on roof = 12 kN/m^2

g) Total DL on floor = 10 kN/m^2

h) LL = 4 kN/m^2,

i) Thickness of slab = 120 mm

All columns having their longer side in X direction. Neglect weight of infill walls. Assume suitable data if required. Write all your assumptions & clauses of IS 1893 (2002). Building is provided with additional viscous dampers which will increase damping by 10%.

SECTION - II

Q4) a) Explain ductile detailing of beam as per IS 13920: 1993. Also give limitation of this code. **[10]**

b) Explain four virtue of good earthquake resistant design. **[8]**

OR

b) Explain soft storey & discuss its performance of soft storey building in past earthquakes. How will you avoid soft storey? **[8]**

Q5) a) Define the shear wall and its classification? Describe the structural behavior of shear wall? **[8]**

b) Draw the detailed sketch of **[8]**

i) Different ways of beam jacketing as IS code and.

ii) Different ways of columns as per IS code.

Q6) a) Explain in details concept of Friction Pendulum Bearings? **[8]**

b) Explain Tuned Liquid Dampers with its working principal? **[8]**

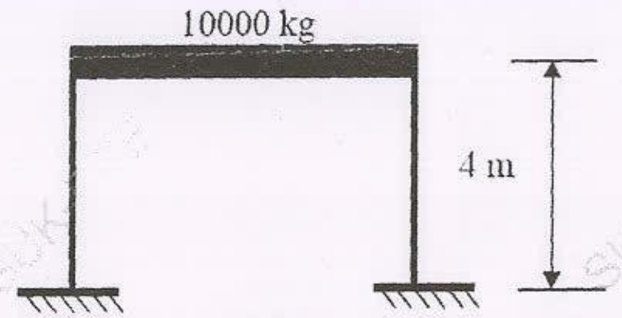


Fig 1.

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
GEOTECHNICAL ENGINEERING - II
Sub. Code: 66874

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Solve any three from following. **[18]**

a) Explain bore hole logging with sketch for soil and rock exploration.

b) List engineering properties of rock. Explain any one with method for determination.

c) Explain elastic settlement of shallow foundation.

d) List types of bearing capacity failure of soil. Explain any one with sketch.

Q2) Solve any two from following. **[16]**

a) Explain standard penetration test for determination of bearing capacity.

b) A plate load test was carried out on a ground having uniform sand strata up to sufficient depth. The size of the plate used was 30cm×30cm. Determine the bearing capacity and load that can be taken by a column foundation of size 1.2 m× 1.2 m in the above strata for an allowable settlement of 2 cm.

Load(kN)	4.5	9	18	27	36	45	54
Settlement (mm)	0.75	1.25	2.0	3.5	5.38	7.75	10.75

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P.T.O.

c) Write and explain equation of net ultimate bearing capacity of soil for general shear failure by IS code method with shape, depth, inclination of load and water table factor.

)3) Solve any two from following. **[16]**

a) Explain stepwise procedure for design of strap foundation with required equations and sketch.

b) Design a trapezoidal combined foundation for following data:

Column	Size	Load	Remark
A	0.50×0.50 m	2000kN	Column A is on boundary of plot.C/c distance between columns is 5.0 m.Safe bearing capacity of soil is 200kN/m²
B	0.30×0.30m	1500kN	

c) A rectangular foundation of 6.0 mt × 4.0 mt size carries a uniform load intensity 160kN/sq.m and is located at a depth of 1.5 m in a layer of clay having $E=4\times10^4$kN/sq.m and Poisson's ratio as 0.38. This clay layer underlain by second layer of silty soil having $E=7\times10^4$kN/sq.m and Poisson's ratio as 0.48. A hard strata lies below the second layer. Determine the elastic immediate settlement of the foundation.

SECTION-II

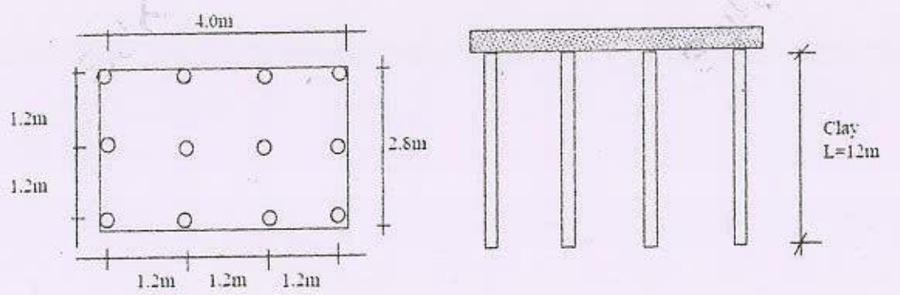
)4) Solve any three from following: **[18]**

a) What is group efficiency of pile group? Explain Feld's rule.

b) Explain with neat sketch under reamed pile and their uses.

c) A rectangular pile of section 0.60 m ×0.75 m and length 12 m penetrates a deposit of clay with c=42 kN/m². Assuming m=0.75, determine the magnitude of negative skin friction.

d) Find the allowable bearing capacity of a single pile in the group of piles given below, by using: Converse-Labarre Formula. Given data:- Diameter: 400mm,Cu=50kPa, $\gamma=18$kN/m³ F.S.=2.5



)5) Solve any two from following: **[16]**

a) Describe the methods of rectifying the tilt in the well during sinking operation.

b) Explain with fig. sand island method.

c) Write the different types and material used for sheet pile.

)6) Solve any two from following: **[16]**

a) Explain the friction circle method of slope stability analysis.

b) Name the techniques used in ground improvement and explain any one.

c) A slope 1 in 2 with a height of 8 m has the following properties of soil are Cu = 28 kN/m², angle of internal friction = 10° and unit weight of soil is 18 kN/m³, Stability Number = 0.064. Calculate factor of safety with respect to cohesion. What will be critical height of the slope in this soil?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
THEORY OF STRUCTURES
Sub. Code: 66873

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**
4) **Assume suitable data if necessary.**

SECTION-I

Q1) a) Explain in brief 'Static Indeterminacy of Structures'. **[5]**

b) Analyze the propped cantilever beam AB of 5m span, fixed at A and propped at B when subjected to a point load of 5kN at 3m from left end A. Take fixed end moment 'M_A' as a redundant. Also draw SFD and BMD. **[12]**

OR

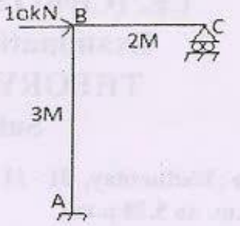
A fixed beam AB 5m in span is subjected to a point load 5kN at 3m from left end A. Analyze the beam by taking 'R_B' and 'M_B' as redundants. Draw SFD and BMD.

Q2) a) Explain 'Unit load Method' to find slope and deflections in structural members. **[5]**

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b) The bent ABC is subjected to lateral load of 10kN as shown in the fig.1 below. Determine the reactions at support C by strain energy method. Draw SFD and BMD **[12]**



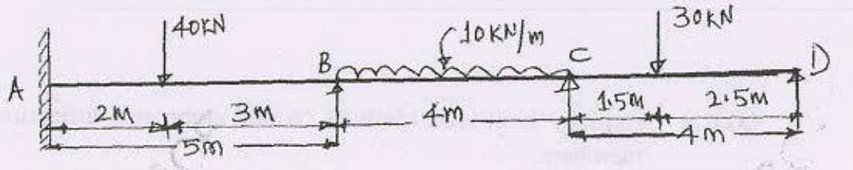
(FIG.1)

)3) A continuous beam ABCD is fixed at A and simply supported at B and C with CD as a overhang wherein AB=4m BC=3m and CD=2m. The span AB is subjected to a udl of 10kN/m throughout, span BC to a point load of 25kN at its midpoint and point D is acted upon by a clockwise couple of 50kNm. During loading support C settles by 5mm. Draw SFD and BMD. Take $EI_{BC} = 2\times10\text{^}4kN/m\text{^}2$. $EI_{AB} = 2EI_{BC}$. **[16]**

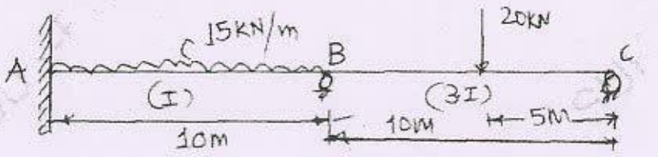
SECTION-II

)4) A two span continuous beam ABC has span AB of 6 m and Span BC of 4 m. End A is fixed while end C of the beam is simply supported. Span AB carries through u.d.l of 20 KN/m and BC carries central point load 40kN.Span AB has its inertia double that of span BC. Analyse the beam using slope deflection method. Draw SFD and BMD. **[17]**

)5) Analysis the continuous beam loaded as shown in fig.by method of moment Distribution method. Sketch the BMD and SFD. **[17]**

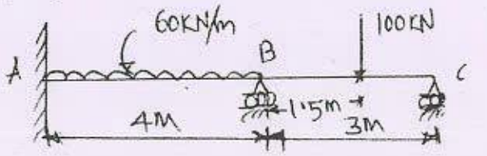


)6) Analysis the two span continuous beam as shown in fig. by stiffness matrix method. Also draw BMD. **[16]**



OR

Analysis the continuous beam as shown in fig.by flexibility matrix method. Take EI constant throughout. **[16]**



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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

GEOTECHNICAL ENGINEERING - I

Sub. Code: 66238

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instruction :

1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any three of the following. **[18]**

a) Derive the relation for bulk unit weight of soil in terms of Sp. Gravity, water content, void ratio of soil and unit weight of water.

b) List and explain corrections applied to hydrometer reading in wet mechanical analysis.

c) Explain soil structures according to structural composition of sedimented soil.

d) A soil has a dry density of 1.72 gm/cc in the natural condition. When the 840 gm of the dry soil was poured in a container in a loose state its volume was 602 cc. The same soil when vibrated and compacted was found to have volume of 440 cc. Determine relative density of the soil.

Q2) Answer any two of the following. **[16]**

a) Explain Darcy's law and its validity used for permeability of soil.

b) Explain flow net. Derive Laplace equation in two dimensional flow used for flow net construction.

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c) The results of constant head permeability test on soil are follows:-

Internal diameter of permeameter - 7.5 cm.

Head lost over a soil sample length of 18 cm- 24.7 cm

Quantity of water collected in 60 seconds - 626 cc

Porosity of the soil sample - 44%

Determine the coefficient of permeability of soil and also discharge velocity and seepage velocity during the test.

Q3) Answer any two of the following. **[16]**

a) List laboratory methods for determination of compaction factors. Explain any one.

b) Explain fixed ring type consolidometer test for determination of compressibility characteristics of soil with neat sketch.

c) The following are the results of the standard Proctor compaction test.

Mass of mould and compacted soil (gm)	2925	3095	3150	3125	3070
Water content (%)	10.0	12.0	14.3	16.1	18.2

Volume of mould - 1000 cc, Mass of mould - 1000 gm,

Sp. Gravity of soil solids - 2.70

Plot the compaction curve showing OMC and MDD. Determine the degree of saturation at MDD.

SECTION-II

Q4) Answer any three of the following. **[18]**

a) With a neat sketch explain pressure bulb and its significance.

b) Write a note on Newmark's chart.

c) Prove that maximum vertical stress on a plane at a distance 'r' from concerned load Q acting at ground surface will be at a depth $z = 1.225r$.

d) A water tank is supported by a ring foundation having outer diameter of 8 m and inner diameter of 6m. The uniform load intensity on the foundation is 300kN/m^2. Compute the vertical stress caused by the water tank at a depth of 4 m below the center of the foundation.

Q5) Answer any two of the following. **[16]**

a) Explain unconfined compression test procedure with neat sketches.

b) An unconfined cylindrical specimen of clay fails under an axial stress of 240 kN/m^2. The failure plane was inclined at an angle of 55° to the horizontal. Determine the shear strength parameters of the soil.

c) The results of two drained triaxial tests on a saturated clay follows:-

Specimen I :- σ_3=70 kN/m^2 and σ_d=130 kN/m^2

Specimen II :- σ_3= 160 kN/m^2 and σ_d= 223.5 kN/m^2

Determine the shear strength parameters. Solved by analytical method.

Q6) Answer any two of the following. **[16]**

a) Derive an expression for Rankine's active earth pressure due to submerged cohensionless backfill with neat sketch.

b) A cantilever retaining wall of 7 m high retains sand. The properties of the sand are e = 0.5, ϕ=30°, and G = 2.7. Using Rankine's theory determine the active earth pressure at the base when the backfill is

i) dry

ii) saturated and

iii) submerged.

c) A retaining wall 6 m high retains a clay backfill with c= 20 kN/m^2, ϕ=15° and γ= 18 kN/m^3. Assume that the wall is smooth and the back vertical. It is expected that tension cracks may develop to the full theoretical depth. Calculate the total active earth force a acting on the wall.

SF-20

Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

ENVIRONMENTAL ENGINEERING - I

Sub. Code :66237

Day and Date : Tuesday, 14- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Assume and mention data if necessary.**

Q1) Answer Any Three of following. **[3 × 6 = 18]**

a) Explain the basis on which the water source is selected for water supply.

b) 'Water should be necessarily treated before municipal supply.' Explain.

c) State details of intake well from its place and importance point of view.

d) Explain design steps for intake well.

e) Write a note on Population Forecasting.

Q2) a) Design a cascade aerator for 10 MLD flow. **[8]**

b) Explain the concept of destabilization of colloidal particles during coagulation. **[4]**

c) Explain the concept of tube & plate settler. **[4]**

Q3) a) What is demineralization? Explain any one process in detail. **[6]**

b) Explain detailed operation of filtration process in rapid sand filter with diagram. **[6]**

OR

b) Explain water softening process. Explain any one in detail. **[6]**

c) Explain forms of chlorination. **[4]**

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SECTION - II

Q4) Answer any three of following. **[3 × 6 = 18]**

a) Explain details of steel pipes with respect to strength, durability, leakage, laying, transportation, availability and advantages.

b) Mention necessity and types of reservoirs in detail.

c) Write a note on

i) Pumping mains

ii) Gravity mains

d) Explain the pressure testing process in detail.

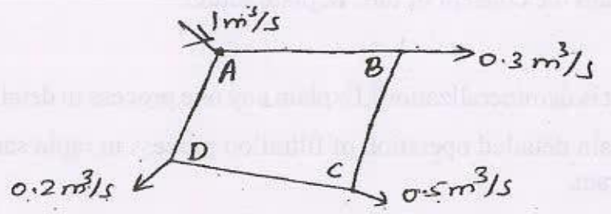
e) Explain factors considered for choice of pipe materials.

Q5) a) What are the various layout patterns of water distribution system? **[5]**

b) A pipe network consist of following pipes- **[8]**

Pipe	Length(m)	Dia(mm)	Friction factor
AB	400	300	0.014
BC	600	300	0.010
AD	500	400	0.012
DC	500	250	0.011

Inflow at A is 1 m3/s, while outflow at B,C and D are 0.3, 0.5 and 0.2 m3/s respectively. Find flow in pipes.



c) "Software plays a vital role in network analysis." Explain. **[3]**

Q6) a) Explain fire hydrants and water meter in detail. **[6]**

b) Explain the maintenance of water distribution system. **[6]**

OR

b) Write a note on green building materials. **[6]**

c) What is water budgeting? **[4]**

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SF - 1008

Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester - V) Examination, November - 2017

DESIGN OF STEEL STRUCTURES (New)

Sub. Code : 66236

Day and Date : Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions Compulsory.**
2) **Use of IS 800:2007, IS 875, Steel table, Non programmable calculator permitted.**
3) **Figure to the right indicate full marks.**
4) **Draw sketches wherever necessary.**
5) **Assume suitable data if required.**

SECTION - I

Q1) a) What is serviceability Limit state? Explain. **[4]**

b) Write note on "High Strength Friction Grip (HSFG) bolts." **[4]**

c) A tension member is subjected to force of 150 KN. The member consists of a plate 75mm × 8mm in size is connected to 10mm thick gusset plate. The grade of steel is Fe 410. Design fillet weld if (a) Weld is provided on two sides of plate in direction of force. (b) Weld is provided on three sides of plate. **[8]**

Q2) a) Explain in brief with sketches the modes of failure of tension members. **[6]**

b) A tension member of a truss consist of two angles 75×50×6 which are provided on either side of a 10mm thick gusset plate. 20mm dia. Bolts are used in one row for connecting the member to the gusset plate. Determine design tensile strength of the member and also the number of bolts required to develop the design tensile strength. **[12]**

OR

b) Design an angle section to carry a factored tensile force of 200 kN. Bolts of 20mm diameter are to be provided for the connection of the member to the gusset plate. Take fy = 250Mpa and fu = 410 Mpa. **[12]**

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23) a) Explain the terms with reference to compression members, (i) Effective length of struts, (ii) Slenderness ratio. **[4]**

b) Two angles 90×60×8 are used as strut 3m long and connected to 10mm thick gusset plate at each end. Determine the design strength of the strut for the following cases. **[12]**

i) When the longer leg of the angle are connected on either side of gusset plate.

ii) When the longer leg of the angle are connected to same side of gusset plate

SECTION - II

24) a) Why lacing is provided for column? How much load is taken by lacing. **[4]**

b) Design a 8m long built up column to carry a factored axial load of 1250 KN . The column is restrained in position but not direction at each end. The column shall consist of two channels placed toe to toe at a suitable spacing. **[12]**

OR

b) An ISHB400 @759.3 N/m column carries a factored axial load of 2000 KN. Design a slab base for the column. Assume that the bearing surfaces of the column and base plate are machined. The concrete footing is of M20 grade. **[12]**

25) a) What is web buckling and web crippling? How the beam checked against web bucking and crippling? **[6]**

b) A 150mm thick slab is supported on steel beams of effective span 5.25m which are spaced at 3.25m c/c. Allow live load of 3.50 kN/m^2 and a 40mm floor finish at 20 kN/m^3.Design the beam and check it for shear. **[12]**

26) a) Draw neat sketch of (i) crane gantry girder assembly (ii) the typical cross sections for gantry girder. **[4]**

b) The Crane system has the following data. Determine the design forces acting on it. **[12]**

- Crane capacity = 100kN
- Weight of crane girder = 90kN
- Weight of crab,motor,hook = 20kN
- Minimum hook Approach = 1.1 m
- Wheel base = 2.5 m
- Span of gantry girder = 5.5 m
- Weight of gantry girder = 8 kN
- c/c spacing of crane rails = 20 m

The crane is electrically operated.

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester-V) (Revised) Examination, November - 2017

WATER RESOURCES ENGINEERING - I

Sub. Code : 66235

Day and Date : Thursday, 09-11-2017 **Total Marks : 100**

Time : 10.0 a.m. to 1.00 p.m.

Instructions :
1) **Que. 1 and 5 are Compulsory. Attempt any two questions from remaining questions from both sections.**
2) **Assume any suitable data if necessary, wherever needed.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain infiltration capacity of the soil with help of a graph. Explain the effects of infiltration. **[6]**

b) Describe the procedure to construct unit hydrograph from storm hydrograph. **[6]**

c) Explain how discharge of the water stream is measured? Explain any one method in detail. **[6]**

Q2) a) Exnlist different methods of assessment of average precipitation. Explain any one method in detail with a neat sketch. **[8]**

b) Define evaporation process. Describe the factors affecting evaporation and also the measures to reduce it. **[8]**

Q3) a) Define unit hydrograph. List the assumptions and limitations involved in unit hydrograph theory. **[8]**

b) Given below are the ordinates of 4 hour unit hydrograph. Derive and plot 16 hour unit hydrograph. Describe the procedure in detail. **[8]**

Time(hours)	0	4	8	12	16	20	24	28	32	36	40
Observed flow(m^3)	0	16	58	89	145	80	55	36	16	8	0

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Q4) Write detailed notes on: **[16]**

a) Abstract losses from precipitation

b) Factors affecting runoff

c) Site selection criteria for discharge measurement of river.

d) Flood frequency analysis

SECTION-II

Q5) a) Define porosity, specific yield and specific retention and obtain relation between them. **[6]**

b) The base period, intensity of irrigation and duty of water for various crops under a canal system are given below. Determine the reservoir capacity if culturable commanded area is 40000 hectors, canal losses are 20% and reservoir losses are 10%. **[6]**

Crop	Base period (Days)	Duty of water at the field (Hectors/ cumec)	Intensity of irrigation (Percentage)
Cotton	180	1400	10
Sugar cane	360	1700	20
Wheat	120	1800	20
Rice	120	800	15
Vegetables	120	700	15

c) Explain Bandhara irrigation scheme in detail. **[6]**

Q6) a) Derive an expression for discharge from a well in unconfined aquifer the well fully penetrates it. **[8]**

b) Briefly explain role of ground water in water resources development of country. **[8]**

Q7) a) Explain in detail following: **[6]**

i) Intensity of irrigation

ii) Kor watering

iii) Kor depth

iv) Kor period

v) Crop ratio

vi) Overlap allowance

b) Explain estimation of evapo-transpiration by penman method. **[5]**

c) Discuss in brief water logging and land drainage. **[5]**

Q8) a) Explain need and importance of water shed management. **[8]**

b) Explain with neat sketch the layout, main components and working of percolation tanks also explain its advantages and disadvantages. **[8]**

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Part - III) (Semester - V) (Revised) Examination, November - 2017

TRANSPORTATION ENGINEERING - I

Sub. Code : 66239

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Explain the classification of roads according to Lucknow Road Plan. **[8]**

b) Explain the factors controlling the highway alignment. **[8]**

OR

b) What do you understand by 'Stopping Sight Distance'? State the factors affecting Stopping Sight Distance. Calculate the SSD on a level road for design speed of 60 kmph for two-way traffic on a single lane road. Assume coefficient of friction 0.36 and reaction time of driver as 2.5 Seconds. **[9]**

Q2) a) What is the significance of 'Penetration Test on Bitumen'? Explain the procedure in detail. **[8]**

b) Explain functions of the components of a flexible pavement with sketch. **[8]**

OR

b) Explain 'CBR Test'. How the pavement thickness is determined by CBR method? **[9]**

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Q3) a) What are the objects of conducting 'Traffic Volume Study'? Explain the methods of Traffic Volume Study. [8]

b) Explain the steps of construction of Cement Concrete Pavements. [8]

OR

b) State the necessity and methods of Highway Drainage. [8]

SECTION - II

Q4) a) Explain movement of aeroplane about three axes with a neat sketch. [8]

b) Explain with sketches, [8]

i) Fillets,

ii) Holding Apron

OR

b) Determine the length of runway required for following data, [9]

Basic runway length under standard conditions = 1200m

Site elevation above M.S.L. = 900 m

Aerodrome reference temperature = 16°C

Effective gradient = 0.5%

Q5) a) Explain with sketches, [8]

i) Wave action on a sea wall

ii) Littoral Drift

b) Explain Dry Docks and Wet Docks. [8]

OR

b) Explain the requirements of a harbour. State the factors to be considered while selecting a harbour. [8]

Q6) a) Explain: [8]

i) Lighting in tunnels;

ii) Ventilation in tunnels

b) Explain 'Shield Method' of tunneling in soft ground with sketch. [8]

OR

b) Explain the operations in sequence in one cycle of tunneling in hard rock. [9]

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Total No. of Pages : 3

Seat No.	

T.E. (Civil Engg.) (Part - II) (Semester - VI) (Revised) Examination, November - 2017
ENGINEERING MANAGEMENT
Sub. Code: 66875

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) a) Enumerate principles of management given by Henry fayol and explain any three of them? **[8]**

OR

a) With suitable example explain decision tree? **[8]**

b) Four salesman are to be assigned to four district Estimates of sales revenue in thousands of rupees for each salesman is given below.

Assign salesman to the district. **[10]**

Salesman	District			
	A	B	C	D
01	32	35	40	28
02	40	25	30	22
03	42	27	34	30
04	25	39	41	35

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P.T.O.

Q2) a) Enumerate types of organization? With neat organization structure diagram explain any one along with its advantages and disadvantages? **[8]**

OR

a) Define planning? Explain process and characteristic of planning? **[8]**

b) Calculate total cost of inventory & EOQ from following annual consumption of 36000 units, inventory carrying cost is 20%per annum with ordering cost 25 RS associated with one order & cost per item is 1 Rs? **[8]**

Q3) Write any two **[16]**

a) Derive derivation for EOQ formula.

b) State and describe importance of management in construction industry.

c) Explain ABC analysis concept with neat graph?

SECTION - II

Q4) a) Suggest which equipment should be purchased if rate of interest is 12% per year by using present worth method.

	Equipment A	Equipment B
Initial Cost (Rs)	Rs 25000/-	Rs 35000/-
Annual O & M cost (Rs)	Rs 9000/-	Rs 7000/-
Salvage value (Rs)	Rs 2000/-	Rs 3500/-
Life (in Years)	5	5

[12]

b) With suitable example explain the term equivalence. **[6]**

OR

b) With suitable example explain the term time value of money. **[6]**

Q5) a) Draw a typical layout for site of construction of multistoried building. **[5]**

OR

a) What do you know about child labour act? **[5]**

b) What are the factors considered for site layout? **[5]**

c) Write a detailed note on building and other construction workers act. **[6]**

Q6) Write Any 2 **[16]**

a) Write down procedure for value analysis?

b) Draw quality circle organization structure and explain benefits of quality circle?

c) With neat flow chart describe the procedure of work study?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (New) Examination, November - 2017

ENGINEERING GEOLOGY

Sub. Code: 66876

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Answer to the two sections must be written in one and same answer book.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) Attempt any two of the following:

a) Describe with neat sketches depositional features formed by river. **[9]**

b) What is meant by Igneous Rock? Give the classification of Igneous Rocks on the basis of mode of occurrence. Mention one rock from each group. **[9]**

c) What are the parameters of fault? Explain the causes of faulting. **[9]**

Q2) Attempt any two of the following:

a) Explain in brief various process of weathering. **[8]**

b) What is metamorphism? Describe in detial the agents of metamorphism. **[8]**

c) Describe with the help of neat sketches the part of folds. Give in brief the Civil Engineering significance of fold. **[8]**

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Q3) Write short notes on: [16]

a) Interior of the Earth.

b) Grain size classification of Sedimentary Rocks.

c) Types of unconformity.

d) Scope of Engineering Geology.

SECTION-II

Q4) Attempt any two of the following:

a) Explain the various causes of earthquake. Write a brief note on RIS. [9]

b) Describe the internal causes of landslides. [9]

c) With a suitable sketch explain the zones of groundwater. [9]

Q5) Attempt any two of the following:

a) Explain the various steps in the preliminary geological investigation at a civil engineering site. [8]

b) Data obtained from a drill hole at foundation site is as follows. [8]

i) Top of borehole- R.L.410 m.

ii) Bottom of borehole- R.L. 380 m.

iii) Length of each piece of core obtained between 400m and 397m is, 16, 11, 13, 09, 08, 21, 23, 06, 05, 09, 08, 14, 19, 23, 21, 16, 18, 07, 06, 07, 10

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Find,

1) Total length of core recovered

2) Core Recovery

3) Core loss

4) RQD

c) Explain the suitable and unsuitable conditions for excavating a tunnel. **[8]**

Q6) Write short notes on the following: **[16]**

a) Dams on Deccan Trap.

b) Overbreak.

c) Observations during drilling.

d) Confined aquifer.

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Total No. of Pages : 3

Seat No.

S.E. (Civil) (Part - II) (Semester-IV) Examination, November - 2017
FLUID MECHANICS - II
Sub. Code : 63347

Day and Date : Monday, 06-11-2017 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) Question no. 1 and 5 are compulsory.
2) Attempt any other two questions from each section.
3) Assume any suitable data if necessary.
4) Figures to the right indicate full marks.

SECTION-I

Q1) a) Design an efficient trapezoidal channel of side slope2H:1V bed slope 1 in 4900 to carry a discharge of $8m^3/sec$. Take Manning's n=0.025. [5]

b) Define - Most economical channel section. Derive the formula for most efficient triangular section. [5]

c) Derive an expression for the loss of energy due to hydraulic jump in a rectangular channel is in the form of [5]

$$\Delta E = \frac{(Y_2 - Y_1)^3}{4 Y_1 Y_2}$$

d) Compare Gradually Varied flow and Rapidly Varied Flow? [5]

Q2) a) Draw the following [5]
i) Specific energy curve.
ii) Specific force curve.
iii) Discharge diagram.

b) A 3m wide rectangular channel carries a discharge of $1.85m^3/sec$ at a depth of 0.5m. Find the greatest allowable contraction in the width to get critical flow at the contracted section. [5]

c) Derive Chezy's formula for uniform flow in an open channel. [5]

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Q3) a) Derive the expression

$$(dy/dx)=\frac{So-Sf}{1-Fr^2}$$

Where (dy/dx) =Water surface slope

So = channel bottom slope

Sf = Energy line

Fr = Froude Number **[5]**

b) Discuss the relation between water surface slope and channel bottom slope. **[5]**

c) Write a note on M_1 and M_3 curve. **[5]**

Q4) a) Derive the expression for hydraulic jump

$$\frac{Y_2}{Y_1}=\frac{1}{2}\left\{-1+\left(1+8\left(Y_c/Y_1\right)^3\right)^{1/2}\right\}$$

Where Y_1 = depth of water before jump

Y_2 = depth of water after jump

Y_c = critical depth. **[5]**

b) A rectangular channel 7.5m wide has a uniform depth of flow of 2.0m and has a bed slope of 1 in 3000. If due to weir constructed at the down stream end of the channel, water surface at a section is raised by 0.75m. Determine the water surface slope with respect to horizontal at this section. Assume Manning's n = 0.02. **[5]**

c) A rectangular channel carries a discharge of $2m^3$/sec per meter width. If the loss of energy in the hydraulic jump is found to be 2.75m, determine the conjugate depths before and after the jump. **[5]**

SECTION-II

Q5) a) Discuss the advantages of Triangular weir over Rectangular weir. **[5]**

b) Write a note on ventilation of weir. **[5]**

c) What are advantages of hydro-electric power plant. **[5]**

d) What are the different efficiencies of a centrifugal pump. **[5]**

Q6) a) Derive an expression for the force exerted by the jet at centre on a stationary curved plate. **[5]**

b) A 50mm diameter jet having a velocity of 25m/sec strikes a flat plate the normal of which is inclined at 30° to the axis of the jet. Calculate the normal force exerted on the plate. **[5]**

i) When the plate is stationary.

ii) When the plate is moving with a velocity of 10m/sec in the direction of the jet.

c) In an experiment on a 90°V notch, the flow is collected in a rectangular tank having the cross section 0.8×0.8m.If the water level in the collecting tank changed from 0.7m to 1.4m in 17.2 seconds when the head over the notch was 0.2m, estimate the coefficient of discharge for the notch. **[5]**

Q7) a) Write short note on NPSH- centrifugal pump. **[5]**

b) Define Static head, Manometric head, Delivery head, Gross head and suction head. **[5]**

c) Write short note on common pump troubles. **[5]**

Q8) a) What is hydraulic turbine? How are they classified? **[5]**

b) What are disadvantages of hydroelectric power generation? **[5]**

c) Draw the figure of Francis turbine. **[5]**

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Total No. of Pages : 3

Seat No.	

S.E. (Civil Engineering) (Semester-IV) (New) Examination, November - 2017
CONCRETE TECHNOLOGY
Sub. Code :63346

Day and Date : Friday, 03- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) a) Describe effect of impurities in water on properties of concrete. **[8]**

b) Describe the procedure for determining standard consistency of cement. **[8]**

Q2) a) Define placing of concrete and describe the different method of placing of concrete. **[8]**

b) Compare slump test and compacting factor test for determining the workability of concrete. **[8]**

OR

b) What do you mean by mineral admixture? Explain in detail silica fume and GGBS? **[8]**

Q3) a) Enlist different tests for hardened concrete. Explain Split cylinder test. **[9]**

b) What is creep and shrinkage of concrete? List the factors affecting creep and shrinkage of concrete. **[9]**

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SECTION - II

Q4) Write short notes (any three) **[18]**

a) Ferrocement

b) No-fines concrete

c) Vacuum Dewatered Concrete

d) Roller Compacted Concrete

Q5) a) What is durability of concrete? Enlist factors affecting durability of concrete. Explain any one in detail. **[8]**

b) What is permeability of concrete? Enlist factors affecting permeability of concrete. Explain any one in detail. **[8]**

OR

b) List various Non-Destructive tests for assessment of strength of concrete. Explain Rebound Hammer test. **[8]**

Q6) Define the "Mix design" and design concrete mix M20 using following data and IS: 10262 procedures. **[16]**

a) Max. size of aggregate - 20 mm

b) Degree of workability = 0.80 CF

c) Degree of quality control = good

d) Type of exposure = mild

e) w/c = 0.47

f) Cement used = OPC 53 grade

g) Sp. Gravity of cement = 3.15, Coarse aggregate = 2.85, Fine aggregate = 2.65

h) Water absorption of Coarse aggregate = 0.5%, Fine aggregate = 1.0%

i) Free moisture in C.A. =0.0%, F.A. = 0.0%

j) Bulk density of Cement = 1440, C.A. = 1650, F.A. = 1800 kg/m^3

Take standard deviation: 5 and Tolerance factor: 1.65

Table No. 2 Maximum Water Content per Cubic Meter of Concrete for Nominal Maximum Size of Aggregate

Sr.No.	Nominal Maximum Size of Aggregate	Maximum Water Content kg/m^3
1	10	208
2	20	189
3	40	165

Table No. 3 volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate

Sr.No.	Nominal Size of Aggregate	Zone IV	Zone III	Zone II	Zone I
1	10	0.50	0.48	0.46	0.44
2	20	0.66	0.64	0.62	0.60
3	40	0.75	0.73	0.71	0.69

Sl. No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Contents kg/m^3	Maximum Free W/C ratio	Minimum Grade of concrete	Minimum Cement Content kg/m^3	Maximum Free W/C ratio	Minimum Grade of Concrete
1.	Mild	220	0.60	-	300	0.55	M 20
2.	Moderate	240	0.60	M 15	300	0.50	M 25
3.	Severe	250	0.50	M 20	320	0.45	M 30
4.	Very Severe	260	0.45	M 20	340	0.45	M 35
5.	Extreme	280	0.40	M 25	360	0.40	M 40

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Total No. of Pages :3

Seat No.	

S.E. (Civil) (Semester - IV) (Revised) Examination, November - 2017
SURVEYING - II
Sub. Code: 63345

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Answer any THREE questions from Each section.**
2) **Figures to the RIGHT indicate FULL marks**
3) **Assume suitable data if NECESSARY and state them clearly.**
4) **Answers shall be supported by adequate sketches.**

SECTION-I

Q1) Attempt any three questions.

a) Explain the theory of Stadia tacheometry in detail. **[7]**

b) To find the RL of station C two observations are taken by a theodolite from station A. One to a BM and the other to the station C. The record as follows.

Inst. station	Staff station	Target	Vertical angle	Staff Reading	Remark
A	BM	Lower Upper	–12°30' –8°20'	0.565 2.565	RL of BM=755.5m
A	C	Lower Upper	–7°30' +3°12'	1.25 3.2	

Find RL of C and the distance between the BM and station C. BM and stations A,C are collinear. **[10]**

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Q2) a) What are the factor consider for selection of base line? [4]

b) Explain the principle of EDM. [4]

c) Two triangulation stations A and B 60 km apart and have elevations 240 m and 280m respectively. Find minimum height of signal required at B so that line of sight may not pass near the ground than 2 meters. The intervening ground may be assumed to have uniform elevation of 200m. [9]

Q3) Write a short note any four. [16]

a) Tacheometric contouring

b) Total station

c) Trilateration

d) Reconnaissance in triangulation

e) Triangulation figures.

Q4) a) What is spherical triangle? Discuss its properties. [5]

b) Define the following terms.

i) Rational horizon

ii) Prime vertical

iii) Visible horizon [6]

c) Explain the significance of Polaris in field astronomy. [5]

SECTION-II

Q5) a) Derive an expression for calculating ordinates from long chord. [5]

b) Find out the necessary data for setting out a simple circular horizontal curve by the method of offsets from chords produced. Take peg interval as 20m., angle of intersection as 144°, radius of curve as 300m., chainage at point of intersection as 1390 m. [9]

c) What are the functions of a Transition curve. [3]

Q6) a) Draw a neat line diagram of mirror stereoscope and also explain the principle on which it works. [6]

b) Calculate the maximum number of photographs required to cover a fairly level area with the following data. Scale of photography is 1:10,000, Area is 100Sq.Km, Longitudinal overlap is 60% , Side lap is 30%, Size of photographs is 20 cm. × 20 cm. [6]

c) Discuss the uses of Photogrammetry. [5]

Q7) a) Explain Electromagnetic energy and its interaction with matter. [8]

b) Describe in brief the segments of GPS. [5]

c) What are the advantages of GIS. [3]

Q8) Write short notes on. [16]

a) Vertical curves

b) Reverse curves

c) Fiducial marks and fiducial axes

d) Atmospheric windows.

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Total No. of Pages : 3

Seat No.	

S.E. (Civil) (Semester - IV) (Revised) Examination, November - 2017

STRUCTURAL MECHANICS

Sub. Code : 63344

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of electronic calculator is permitted.**
4) **Assume suitable data if necessary and mention it clearly.**

SECTION - I

Q1) a) Derive the for normal and tangential stresses on a plane making angle θ with σ_x direction. **[6]**

b) A thin cylinder with 1000 mm dia. and 20 mm wall thickness is subjected to internal pressure of 2 MPa. In addition the cylinder is subjected to shear stress of 30 MPa. Calculate the principal stresses and their orientation. **[10]**

Q2) a) Derive the limiting value of eccentricity on rectangular section for no tension condition and show the kern of the section. **[6]**

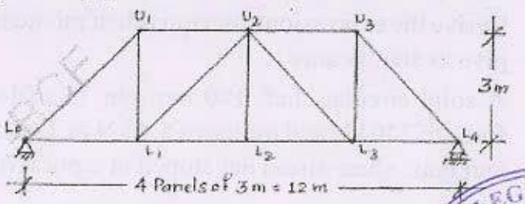
OR

Discuss different modes of failure of gravity dam and their significance in analysis of dam.

b) A trapezoidal masonry dam 4 m high is 1 m wide at top and 3 m wide at base retains water against vertical face. Determine max. and min. intensities of pressure. Unit weight of masonry = 20 kN/cum. **[10]**

Q3) Attempt any two : **[2 × 9 = 18]**

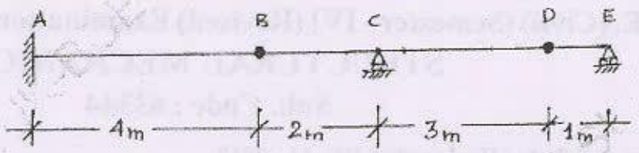
a) Construct the influence line diagrams for force in members U_1U_2, L_1L_2, L_2U_3 and U_1L_1 of the through truss shown in fig. 1



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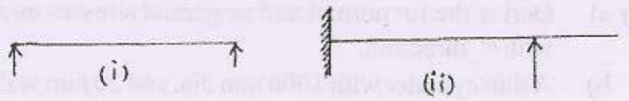
b) Construct the influence line diagrams for reaction at A and moment at A of the compound beam shown in fig. 2.



c) Using the I.L.D.s of Q.3 (b) find the values R_A and M_A when load of 100 kN acts at D.

SECTION - II

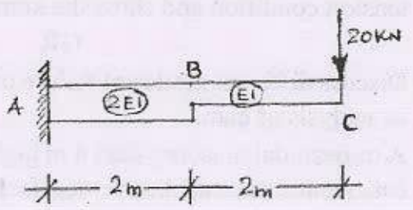
Q4) a) State the conjugate beam theorems with neat diagrams and draw the conjugate beams for the beams shown in the fig.3. **[6]**



OR

Using double integration method find the central deflection of the simply supported beam subjected to u.d.l. on entire span.

b) Find the slope and deflection at end C of the beam shown in fig. 4. **[10]**



Q5) Attempt any two : **[2 × 9 = 18]**

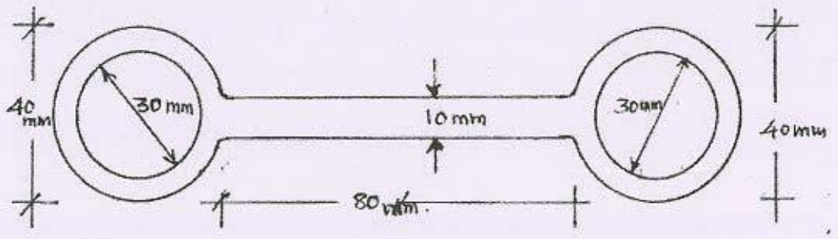
a) The maximum allowable shear stress in a hollow shaft whose outer dia. is twice the inner dia. is 80 MPa. Determine the diameter of the shaft if it is subjected to torque of 4 kN.m. and bending moment of 3kN.m.

b) Derive the expressions for equivalent moment and equivalent torque and give its significance.

c) A solid circular shaft 100 mm dia. is subjected to axial compressive force of 240 kN and torque of 5.4 kN.m. Determine the principal stresses and max. shear stress developed at a point on the surface of the shaft.

Q6) a) State the assumptions and limitations of the Euler's formula. **[5]**

b) The member of a frame of machine acts as strut with both ends fixed. The cross section of the member is formed of two tubes and a plate welded as shown in fig.5. The length of the member is 1.5 m. Taking factor of safety = 6 find the maximum load the member can resist. Take $f_y = 320$ N/mm², $\alpha = 1/7500$. **[11]**



Q8) Write short notes on any three of following: [18]

a) Concept of HGL and TEL with illustrative sketches.

b) Use of Moody's chart.

c) Boundary layer: concept, separation and control.

d) Water hammer and surge tank.

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Total No. of Pages :4

Seat No.

S.E. (Civil) (Semester - III) Examination, November - 2017
FLUID MECHANICS - I
Sub. Code: 63341

Day and Date :Tuesday, 21 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions : 1) Attempt any three questions from each section.
2) Figures to the right indicate full marks.

SECTION - I

Q1) a) Define and explain significance of following fluid properties with their SI units. [8]

i) Viscosity.

ii) Bulk modulus of elasticity.

iii) Vapor pressure.

iv) Surface tension and Capillarity.

Give practical examples.

b) Find the form of equation for discharge Q through a sharped edged triangular notch, which depends on central angle α of notch, head H , acceleration due to gravity g , density ρ, viscosity μ and surface tension σ. Use Buckingham π theorem of dimensional analysis. [8]

Q2) a) Explain how to calculate total pressure acting on a curved surface immersed in liquid. [4]

b) Find total pressure acting on unit length of a dam with vertical upstream face for a depth of water 50 m out of which bottom 10m is silt of specific gravity 1.2. Draw a sketch to show pressure diagram. [6]

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c) A wooden cylinder of circular section and uniform density, specific gravity 0.6 is required to float in oil of specific gravity 0.8. If the diameter of the circular is d and its length is '1' can not exceed about 0.817d for cylinder to float with its longitudinal axis vertical. **[6]**

Q3) a) What is flownet? What are methods of drawing flownet? Give the uses of flownet and its limitations. **[6]**

b) Define stream function and velocity potential function.

The velocity components in a 2 dimensional flow field for an incompressible fluid are expressed as **[6]**

$$u = y^3/3 + 2x - x^2y$$

$$v = xy^2 - 2y - x^3/3$$

Obtain an expression for stream function ψ

c) Two velocity components are given in the following case, find the third component such that they satisfy the continuity equation. **[4]**

$$u = x^3 + y^2 + 2y^2$$

$$v = -x^2y - yz - xy$$

Q4) Write short note on any three of following : **[18]**

a) Dimensionless numbers and their significance in model studies.

b) Stability of submerged and floating bodies.

c) Types of flow in pipe with practical examples.

d) Pressure measurement devices.

SECTION - II

Q5) a) Derive Euler's equation of motion along a stream line and further derive Bernoulli's theorem. What are the limitations. **[8]**

b) A venturimeter is to be fitted in a pipe of 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is 8.1 m^3/min. Find the least diameter of throat to ensure that the pressure head does not become negative. Take Cd = 0.96 **[4]**

c) Derive the expression for time required to empty the tank through an orifice. **[4]**

Q6) a) Explain Reynold's experiment. **[6]**

b) Oil of viscosity 0.1 Pa.s and specific gravity 0.90, flows through a horizontal pipe of 25 mm diameter. If the pressure drop per meter length of the is 12 KPa. Determine,

i) The rate of flow in N/min.

ii) The shear stress at the pipe wall.

iii) The Reynold's number of the flow

iv) The power required per 50 m length of pipe to maintain the flow. **[6]**

c) What do you mean by hydraulically smooth and rough boundaries. **[4]**

Q7) a) What are the different losses in pipe flow? Derive expression for each loss. **[8]**

b) A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/s. What loss of head and the corresponding power would be saved if the central 2 m length of pipe was replaced by 75 mm diameter pipe, the change of section being sudden? Take f = 0.04 for the pipes of both diameter. **[8]**

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Seat No.	

Total No. of Pages : 3

SE (Civil) (Part - II) (Semester - III) Examination, November - 2017

STRENGTH OF MATERIALS - I (Revised)

Sub. Code : 63340

Day and Date :Wednesday, 15 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non - programmable calculator is allowed.**
4) **Assume any suitable data if required and state it clearly.**

SECTION - I

Q1) a) Explain with neat diagram, Stress-Strain Curve of mild steel rod under axial tensile force. **[4]**

b) The rod ***ABC*** is made of an aluminum for which E = 70 GPa as shown in Fig. 1. Knowing that ***P*** = 6 kN up at point ***A*** and ***Q*** = 42 kN down at point B, determine the deflections at point A and point ***B***.***AB*** = 0.4 m and 20 mm dia, ***BC***= 0.5 m and 60 mm dia. **[13]**

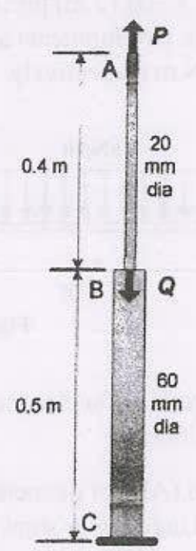


Fig. 1

OR

a) Explain Saint-Venant's principle with neat diagrams. **[4]**

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b) At room temperature (21° C) a 0.5 mm gap exists between the ends of aluminum and steel rods of lengths 300 mm and 250 mm respectively as shown in Fig. 2. When temperature is reached 160°C, determine normal stress in aluminum bar and change in length of aluminum bar. **[13]**

Aluminum rod: Area = 1806 sq.mm, E_A= 72 GPa, α_A = 23.9 x 10^{-60}/C.
Steel rod: Area = 774 sq.mm, Es= 190 GPa, α_s = 17.3 x 10^{-60}/C

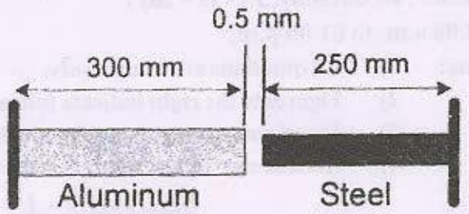


Fig. 2

22) a) Explain with neat diagrams, relationship between load, shear force and bending moment. **[4]**

b) Draw Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for a cantilever beam ABC of length 3 m, fixed at A and free at C as shown in Fig. 3. AB (2 m) portion is loaded with uniformly distributed load of I kN/m, two moments are applied at B and C with magnitude 2 kN.m and 3 kN.m respectively. **[13]**

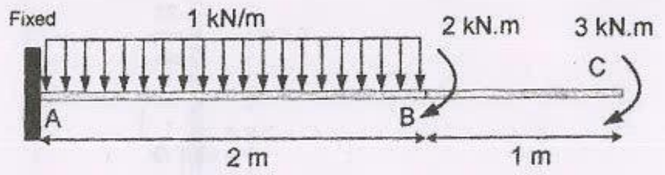


Fig. 3

23) a) Derive an expression for circumferential stress and longitudinal stress in thin walled cylinders. **[4]**

b) Two rods, steel (AB) of diameter 38 mm and brass (BC) of diameter 46 mm connected together as shown in Fig. 4. If allowable shear stresses in steel and brass rods are 104 MPa and 55 MPa, find largest torque T applied atA. **[12]**

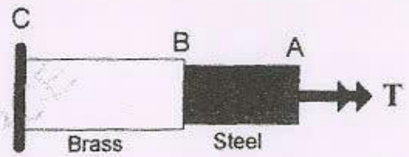


Fig. 4

SECTION - II

24) a) A beam 80 mm × 120 mm is 4 m long simply supported at its ends. The beam supports a central load W at the center of span of beam. If the maximum bending stress is limited to 4000 N/sq.cm. Find the value of W when. **[9]**

i) Smaller dimension is used as depth

ii) Greater dimension is used as depth.

b) A cantilever beam of span 3 m carries uniformly distributed load of 2 kN/m. If the beam is of rectangular cross section, whose depth is twice the width of section, find width and depth of the beam. Allowable bending stress is 14000 N/sq.cm. **[8]**

25) a) Draw shear stress distribution diagrams for I and T sections with maximum and average values. **[4]**

b) T sectional steel beam having flange of 100 mm × 20 mm and web 10 mm × 150 mm. Draw shear stress distribution across the depth of the section. If the beam is simply supported over a span of 5 m subjected to uniformly distributed load of 40 kN/m over entire span. **[13]**

26) A weight of 25 kN falls through 40 mm on a collar rigidly attached to the lower end of vertical steel bar of length 3.5 m and having area of 6.5 cm^2. What is the instantaneous maximum stress and corresponding instantaneous maximum strain of the bar. Take E_s = 200 GPa **[16]**

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Total No. of Pages : 3

Seat No.	

S.E. (Civil) (Semester - III)
Examination, November - 2017
SURVEYING - I
Sub. Code : 63339

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Answer any THREE questions from EACH section.**
2) **Figures to the RIGHT indicate FULL marks.**
3) **Assume suitable data if NECESSARY and state them clearly.**
4) **Answers shall be supported by adequate sketches.**

SECTION - I

Q1) Solve (6 marks each) **[18]**

a) Explain test and adjustment for setting the bubble axis parallel to line of collimation for dumpy level.

b) Explain auto level with diagram of tilt compensator.

c) Derive expression for correction for curvature and refraction.

Q2) a) State and explain significance of temporary and permanent adjustments for a Level. **[8]**

b) While carrying out two peg test following data are collected for a level **[8]**

Distance AB= 100 m

Instrument at C, 50 m i.e. midway between A&B

Reading at A = 2.5 m reading at B = 3.5 m

Instrument at D in line AB 25 m from B such that AD= 125 m

Reading at A= 2.0 m reading at B = 3.25 m

If the instrument is to be adjusted what procedure will you follow?

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)3) a) The perpendicular offsets taken at 10m interval from a survey line to an irregular boundary are 2.25,3.85 ,4.5 ,6.8,5.2 ,7.35 ,8.9,8.3, & 5.45 m. determine the enclosed area by **[8]**

i) Average ordinate rule

ii) Trapezoidal rule

iii) Simpson's rule.

b) Define area of zero circle and methods for calculating area of zero circle. Explain any one method in detail. **[8]**

)4) Writes short notes on **[16]**

a) Resectioning in plane table survey.

b) Plane table and its accessories.

c) Block contouring.

d) Factors affecting sensitivity of level tube.

SECTION - II

)5) a) What is the purpose of **[16]**

i) Making face left and face right observations.

ii) Observing the readings on both the verniers.

iii) Repetition method of horizontal angle measurement.

b) Explain stepwise procedure of measuring horizontal angle by reteration method. Also indicate under what circumstances it is preferred. **[6]**

c) Name the fundamental lines of a transit theodolite and also indicate their inter-relationships. **[5]**

)6) a) From the following observations on the traverse ABCD, calculate the length and bearing of the line AB. **[9]**

Line	CA	CD	DB
Length in m.	66.25	330.20	150.00
Bearing	250°45'	15° 20'	270° 15'

b) Explain stepwise procedure for carrying out theodolite traversing. Also, explain the sequential procedure of obtaining total co-ordinates from Gale's traverse table. **[8]**

)7) a) What are Ranges? Name different types of Ranges and their significance. **[5]**

b) Explain how leveling work is carried out in tunnel surveying. **[5]**

c) Explain the construction and use of Nautical sextant. **[7]**

)8) a) Explain by deriving necessary expressions the Double plane method to determine the reduced level of tip of an elevated tower. **[8]**

b) Calculate the length of CD and bearing of the line AB from the following traverse observations. **[8]**

Line	AB	BC	CD	DA
Bearings	Roughly East	178°0'	270° 0'	1° 0'
Length in m.	150.00	75.50	Not obtained	63.00

✦ ✦ ✦

Q6) Attempt any two of the following: [16]

a) Evaluate $\int_0^{1+i} (x^2 - iy)dz$ along the path

i) $y = x$

ii) $y = x^2$

b) Prove that $u = x^2 - y^2$ and $v = \frac{y}{x^2 + y^2}$ are harmonic functions of (x,y) but are not harmonic conjugates.

c) If $f(z) = u+iv$ is an analytic function of $z = x+iy$ and

$u-v = e^{-x}[(x-y)\sin y - (x+y)\cos y]$ find $f(z)$

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Total No. of Pages : 4

Seat No.	

S.E. (Civil Engg.) (Semester - III)
Examination, November - 2017
ENGINEERING MATHEMATICS - III
Sub. Code : 63338

Day and Date : Friday, 10 - 11 - 2017 **Total Marks : 100**
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of Calculator is allowed.

SECTION - I

Q1) Solve any three of the following. [18]

a) $(D^2 - D + 1)\, y = \cos 2x$

b) $(D^2 + 1)\, y = x^2 \sin 2x$

c) $(D^2 + 3D + 2)\, y = e^{e^x}$

d) The differential equation satisfied by a beam uniformly loaded with one end fixed and second subjected to a tensile force P is given by

$$EI\frac{d^2y}{dx^2} = Py - \frac{1}{2}Wx^2$$

Show that elastic curve for the beam under conditions $y = 0$, $\frac{dy}{dx} = 0$ at $x = 0$ is given by $y = \frac{W}{Pn^2}(1 - \cosh nx) + \frac{Wx^2}{2P}$ where $n^2 = \frac{P}{EI}$.

Q2) Attempt any two of the following. [16]

a) Find the directional derivative of $\phi = x^4 + y^4 + z^4$ at the point A(1, –2, 1) in the direction of AB where B is (2, 6, –1). Also find the unit vector normal to the surface $2x^2 + 4yz - 5z^2 = -10$ at (3, –1, 2).

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b) A vector field $\bar{F}$ is given by $\bar{F}=(x^2-yz)i+(y^2-zx)j+(z^2-xy)k$.

Show that $\bar{F}$ is irrotational and find its scalar potential. Also find Grad (div $\bar{F}$)

c) If $\bar{a}$ is a constant vector and $\bar{r}=xi+yj+zk$ then prove that

i) $\nabla(\bar{a}\cdot\bar{r})=\bar{a}$

ii) div $(\bar{a}\times\bar{r})=0$

iii) div $(\bar{a}\cdot\bar{r})\cdot\bar{a}=a^2$

iv) curl $(\bar{a}\times\bar{r})=2\bar{a}$

Q3) Attempt any two of the following. **[16]**

a) Fit a first degree curve to the following data and estimate the value of y when $x=73$

x:	10	20	30	40	50	60	70	80
y:	1	3	5	10	6	4	2	1

b) For the following data fit a curve of the form $y=ax^b$

$x=$	1	2	3	4	5	6
$y=$	1200	900	600	200	110	50

c) From the following data find the line of regression of y on x and of x on y

$x=$	62	64	65	69	70	71	72	74
$y=$	126	125	139	145	165	152	180	208

SECTION - II

Q4) Attempt any two of the following: **[16]**

a) Seven coins are tossed and the number of heads obtained is noted. The experiment is repeated 128 times and the following distribution is obtained.

No.of heads	0	1	2	3	4	5	6	7
Frequency	7	6	19	35	30	23	7	1

Fit a binomial distribution if (i) the coins are unbiased (ii) the nature of coins is not known.

b) A firm produces articles of which 0.1 percent are defective. It packs them in cases each containing 500 articles. If a wholesaler purchases 100 such cases, how many cases can be free from defectives, how many can be expected to have one defective.

c) In a sample of 1000 students, the mean marks of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find

i) how many students score between 12 and 15 marks?

ii) how many students score above 18 marks?

iii) how many students score below 8 marks?

iv) how many students score 16 marks?

(Given: For S.N.V.Z area between Z=0 to 0.4 is 0.1554, area between Z=0 to Z = 0.6 is 0.2257, area between Z=0 to Z = 0.8 is 0.2881, area between Z=0 to Z=1 is 0.3413, area between Z=0 to Z= 1.6 is 0.4452, area between Z=0 to Z=2.4 is 0.4918)

Q5) Attempt any three of the following. **[18]**

a) Find the Laplace transform of $\frac{\sin t\sin 5t}{t}$

b) Find the Laplace transform of $e^{-3t}\int_0^t u\sin 3u\,du$

c) Find the inverse Laplace transform of $\frac{s}{(s^2+1)(s^2+4)}$ using convolution theorem.

d) Use Laplace transform to solve $(D^2+4D+13)y=e^{-t}\sin t$ where $y(0)=0$ and $y'(0)=0$.

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Total No. of Pages : 2

Seat No.	

S.E. (Civil) (Part - II) (Semester - III) (Revised) Examination, November - 2017

BUILDING CONSTRUCTIONS & MATERIALS

Sub. Code : 63342

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of electronic calculator is permitted.**
4) **Assume suitable data if necessary and mention it clearly.**

SECTION - I

Q1) a) Classification of bricks according to IS standards? Also state water absorption and crushing strength limit for the same? **[8]**

b) Draw Cross section through external framed structure wall showing all components in sub structure mentioning their functional consideration. **[8]**

Q2) a) Draw a neat sketch of one and one and half brick thick Flemish Bond masonry. **[10]**

i) Plan of Odd and Even Course.

ii) Elevation for at least six courses.

b) State various types of material used for partition wall. **[6]**

Q3) Write short notes on any three : **[18]**

a) Door fixtures and fastening.

b) Lift.

c) Construction of Wall strip Foundation.

d) Rat trap bond.

e) Arches and their stability consideration.

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SECTION - II

Q4) Design and draw quarter turn staircase to a scale of 1 : 20 the plan and sectional elevation for following data **[25]**

a) Storey height : 3.20 m

b) Staircase internal size 4.8 × 5.8 m

c) Assume data wherever necessary.

Q5) Draw to a scale of 1 : 20 a sectional plan, side view and elevation for T.W. Paneled window for following data. **[25]**

a) Clear opening : 1.5 m × 1.2 m

b) Frame : 125 mm × 75 mm

c) End Style and meeting style : 120 mm × 40 mm

d) Rails : 120 mm × 40 mm

e) Panel material : partly glazed partly teak wood

f) Panel thickness : 20 mm

g) Glass : 4 mm thickness

h) No of shutter : 2 nos

i) No of panel : 4 nos

j) Shows various window fixtures and fastening.



SUK-BCE

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Total No. of Pages : 2

Seat No.	

S.E. (Civil) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

BUILDING DESIGN AND DRAWING

Sub. Code: 63348

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

3) **Assume suitable data if required and clearly mention it.**

SECTION - I

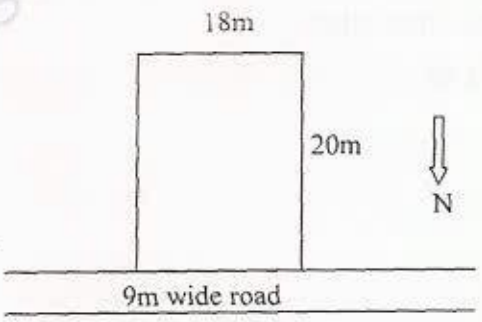
Q1) a) Explain the concept of F.S.I. **[5]**

b) Explain : Site Plan. **[5]**

OR

b) Write short note on 'Circulation' principle of a building planning. **[5]**

Q2) Plan a bungalow (G+1) on the given plot. The requirements are as below,



Name of Room	Tentative Size
Living Room	4 m X 5 m
Children Bed Room	5 m X 3.5 m
Master Bed Room	3.5 m X 4.5 m
Guest Bed Room	3 m X 4 m
Verandah	2.5 X 3 m
Store	1.3 X 2.5 m
Staircase	Suitable Size

Assume any other suitable data.

External walls – 230 mm thick. Internal walls – 150 mm thick.

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SUK-BCE

Draw to a suitable scale the following:

i) Building Plans (Ground and First Floor) [25]

ii) Furniture layout of Living Room [5]

Q3) Write short notes on any ***two:*** [10]

a) Aspect

b) Building Permission

c) Maintenance of building

d) Green building

SECTION - II

Q4) a) Explain the systems of plumbing with sketches. [10]

b) Explain : Intercepting Trap [6]

OR

b) Explain the types of wiring system. [6]

Q5) a) Explain the systems of ventilation with help of sketches. [10]

b) Explain the concept of thermal insulation. [6]

OR

b) Explain : Acoustics [6]

Q6) Write short notes on any ***three:*** [18]

a) Types of Pointing.

b) Characteristics of good paint.

c) Summer air conditioning.

d) Rain water harvesting.

e) Fire resisting building materials.

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SF - 985

Seat No.	

Total No. of Pages : 2

B.E. (F.E.) (All Branchs) (Semester - I & II) Examination, November - 2017

BASIC MECHANICAL ENGINEERING

Sub. Code : 59186

Day and Date :Friday, 24 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions:
1) **Attempt any three questions from each section.**
2) **Figures to right indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

SECTION - I

Q1) a) Define thermodynamic state, thermodynamic process and thermodynamic cycle. **[6]**

b) Explain Kelvin Planck Statement and Clausius statement of second law of thermodynamics. **[4]**

c) In centrifugal compressor the suction and delivery pressure are 100 Kpa and 550 Kpa respectively. The compressor draws 15 m^3/min of air which has specific volume of 0.77 m^3/Kg. At delivery point the specific volume is 0.20 m^3/Kg. The compressor is driven by a 40 Kw motor and during passage of air through the compressor the heat loss to the surroundings is 30 KJ/Kg of air. Neglecting changes in potential energy and kinetic energy calculate increase in internal energy per kg of air. **[6]**

Q2) a) What are similarities and dissimilarities between heat and work? **[6]**

b) What is statement of first law of thermodynamics and state its limitations. **[6]**

c) Steady flow process is applied to nozzle. Steam enters horizontally at a pressure of 10 bar. The pressure of steam at the exit of the nozzle is 1 bar. The internal energy of the steam decreases by 250 KJ/Kg and specific volume increase from 0.2 m^3/Kg to 1.7 m^3/Kg as the steam flows through the nozzle. Find the exit velocity of steam if its inlet velocity is 900 m/min. Heat transferred from nozzle is negligible. **[6]**

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P.T.O.

Q3) a) Compare two stroke and four stroke I.C. Engine. [8]

b) Derive an expression for air standard efficiency for Otto cycle. Explain that the efficiency of an air standard Otto cycle is a function of compression ratio only. [8]

Q4) a) Differentiate between Vapour compression refrigeration and Vapour absorption refrigeration. [4]

b) Define following terms : [4]

i) Dew point temperature

ii) Relative humidity

iii) Wet bulb temperature

iv) Dry bulb temperature

c) Explain with neat sketch Vapour absorption refrigeration system. [8]

SECTION - II

Q5) a) Explain with neat sketch construction and working of Geothermal power plant. [8]

b) Explain axial flow compressor with neat sketch. [8]

Q6) a) Two pulleys having diameter 2 m and 1.5 m are separated by a distance of 5 m. The initial tension in the belt is 3 KN. The coefficient of friction between the belt and pulley is 0.3. Calculate the power transmitted by open belt when a smaller pulley rotates at 200 r.p.m. Neglect centrifugal tension. [8]

b) Explain with neat sketch working of Photovoltaic cell. [8]

Q7) a) Explain manufacturing process. Define metal removing process. Explain any one. [8]

b) Enlist different metal joining processes. Explain brazing process. [8]

Q8) Write short note on : [18]

a) Solar collector

b) Centrifugal pump

c) Sand casting process

▽▽▽▽

SF - 5

Total No. of Pages :2

Seat No.	

F.E. (All Branches) (Part - I) (Semester - I & II) (Revised) Examination, November - 2017

FUNDAMENTALS OF ELECTRONICS AND COMPUTERS

Sub. Code: 59184

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to right indicate full marks.**

3) **Assume suitable data if necessary.**

SECTION - I

Q1) Solve any two : **[18]**

a) Explain HW rectifier with necessary waveforms.

b) What is flip-flop? Explain J-K flip-flop.

c) Write a short note on mobile handset with block diagram.

Q2) Solve any two : **[16]**

a) Explain how transistor operates in CB configuration? Explain with I/P and O/P characteristics.

b) What is De-multiplexer? Explain 1 :4De-mux with truth table

c) Explain washing machine with block diagram.

Q3) Solve any two : **[16]**

a) Explain fixed bias circuit for biasing of transistor. Derive expression for stability factor.

b) Mention names of logic families and explain any one in detail.

c) Explain in details thermistor transducer with an application.

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SECTION - II

Q4) Solve any two : **[18]**

a) What are different hardware component of a computer system. Explain any four of them.

b) What is operating system? Explain different types of OS.

c) Write short note on computer network.

Q5) Solve any two : **[16]**

a) List and explain different topologies of computer network.

b) Explain output devices of computer system.

c) Explain following UNIX/LINUX command with an example.

i) LS.

ii) CD.

iii) CAT.

iv) MKDIR.

v) PWD.

vi) CP.

Q6) Solve any two : **[16]**

a) Explain OSI model.

b) Explain in brief Assembler, interpreter and compiler.

c) Explain low level language and high level language in details.

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SF-1

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Part - II) (Semester - I & II) (New) Examination, November - 2017

ENGINEERING MATHEMATICS-II

Sub. Code : 59933

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) Solve any THREE from the following: (5 marks each). **[15]**

a) $(1+x^2)\frac{dy}{dx}+2xy-4x^2=0$

b) $\left[y\left(1+\frac{1}{x}\right)+\cos y\right]dx+[x+\log x-x\sin y]\,dy=0$

c) $(x^3y^2+xy)\,dx=dy$

d) $(x^2y-2xy^2)dx-(x^3-3x^2y)dy=0$

Q2) Attempt any THREE from the following: (5 marks each). **[15]**

a) Find orthogonal trajectories of the family of curves $x^2+y^2=2ax$, where a is parameter.

b) A 12 V battery is connected to a simple series circuit in which the inductance is $\frac{1}{2}$H and resistance is 10 Ω determine the current i if $i(0)=0$.

c) A body originally at 85° C cools to 65° C in 25 minutes the temperature of air being 40° C, what will be the temperature of the body after 40 minutes.

d) If the population of a country is doubles in 50 years, in how many years will it three times under the assumption that the rate of increase is proportional to the number of inhabitants?

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Q3) Attempt any FOUR from the following: (5 marks each). **[20]**

a) Using Euler's method find the approximate value of y when $x = 1.5$ given $\frac{dy}{dx} = \frac{y-x}{\sqrt{xy}}$ and $y(1) = 2$. Take $h = 0.1$

b) Use Euler's modified method to find the value of y satisfying the equation $\frac{dy}{dx} = -xy^2$ with $y(0) = 2$ for $x = 0.2$

c) Use Taylor's series to solve numerically $\frac{dy}{dx} = 3x + y^2$. Given that $y(0) = 1$ at $x = 0.1$.

d) Apply Runge-Kutta fourth order formula to solve the differential equation $\frac{dy}{dx} = \sqrt{\sin x + \cos y}$, $y(0) = 1$ at $x = 1.5$

e) Solve the following simultaneous differential equations by Runge-Kutta method fourth order $\frac{dy}{dx} = xz + 1, \frac{dz}{dx} = -xy$ for $x = 0.3$ given that $y = 0$, $z = 1$, when $x = 0$.

SECTION - II

Q4) Attempt any THREE from the following: (5 marks each). **[15]**

a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$.

b) Evaluate $\int_0^\infty \frac{x^4(1+x^5)}{(1+x)^{15}} dx$.

c) Prove that $\int_0^\infty \frac{e^{-\alpha x} \sin x}{x} dx = \cot^{-1}\alpha$ and hence deduce that $\int_0^\infty \frac{\sin x}{x} dx = \frac{\pi}{2}$.

d) Define Error function and hence prove that $erf(\infty) = 1$.

Q5) Attempt any THREE from the following: (5 marks each). **[15]**

a) Trace the Strophoid curve $y^2(a+x) = x^2(a-x)$ where $a > 0$.

b) Trace the Leminiscate curve $r^2 = a^2 \cos 2\theta$.

c) Find the length of the arc of $y^2 = 4x$ cut off by the line $3y = 8x$.

d) Show that the length of arc of that part of cardioide $r = a(1+\cos\theta)$ which lies on the side of the line $4r = 3a \sec\theta$ away from the pole is $4a$.

Q6) Attempt any FOUR from the following: (5 marks each). **[20]**

a) Evaluate $\int_1^2 dx \int_1^3 xy^2 dy$

b) Evaluate $\int_0^{\pi/2} \int_0^y \cos 2y \sqrt{1 - a^2 \sin^2 x}\, dx\, dy$

c) Change into polar co-ordinates and hence evaluate $\int_0^a \int_y^a \frac{x^2}{(x^2+y^2)^{3/2}} dx\, dy$.

d) Find by double integration the area lying between the cardioide $r = a(1+\cos\theta)$ and outside the circle $r = a$.

e) ABCD is a square plate of side a and o is the midpoint of AB. If the surface density is proportional to the square of the distance from o, show that the center of gravity of the plate is at a distance $\frac{7}{10}a$ from AB.

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b) A 2000N block is in contact with level plane; coefficient of friction is 0.30, if the block is acted upon horizontal force 650 N. What time elapse before the block reaches a velocity of 10 m/s starting from rest? If 650 N force is then removed how much longer will the block continue to move solve by using impulse-momentum principle. **[12]**

Q6) a) Explain motion under gravity. **[3]**

b) Explain coefficient of restitution. **[3]**

c) A ball dropped from height of 2 m on a smooth floor. The height of the first bounce is 1.62m. Determine

i) coefficient of restitution and

ii) expected height of next bounce. **[10]**

Seat No. [ ]

F.E. (All Branches) (Semester - I & II) (New) Examination, November - 2017

APPLIED MECHANICS

Sub. Code: 59185

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All the questions are compulsory.**
2) **Figures to the right indicate maximum marks for the question.**
3) **Neat sketches should be drawn whenever necessary.**
4) **Use of Non-Programmable calculator is allowed.**
5) **Any missing data may be assumed suitably and clearly highlighted in the anwser sheet.**

SECTION-I

Q1) a) Explain:-

i) Resolution of forces

ii) Couple **[4]**

b) Find resultant for the force system shown in figure and locate it with respect to 'A' **[12]**

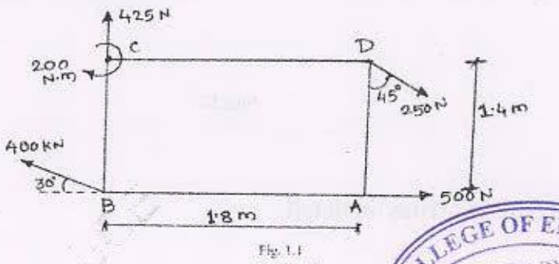


Fig. 1.1

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Q2) a) State and explain virtual work principle. [5]

b) The cylindrical rollers of weight 50 N each are placed inside a cup. Find the reactions at the point of contact. Refer fig. 2.1 [13]

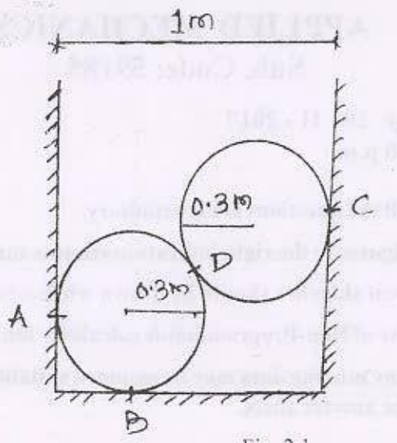


Fig. 2.1

OR

b) Determine the support reaction for the beam shown in fig. 2.2 by using Virtual work principle. [13]

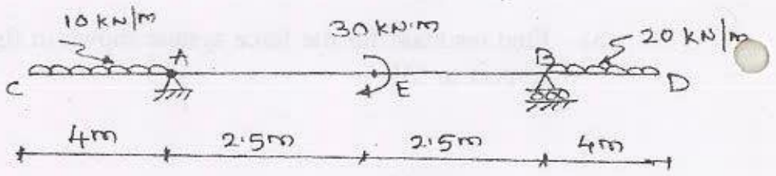


Fig. 2.2

Q3) a) Explain 'Truss' in detail. [4]

b) Determine the forces in all the members of a truss shown in fig. 3.1. [12]

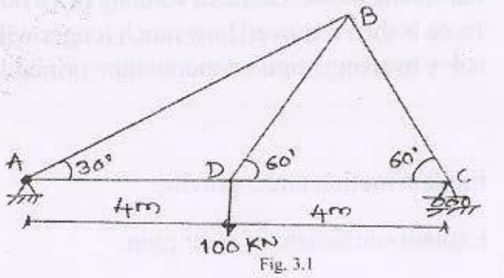


Fig. 3.1

SECTION-II

Q4) a) State and prove parallel axis theorem. [4]

b) Find the moment of inertia for the shaded area about centroidal both mutually perpendicular axes. Refer fig 4.1. [12]

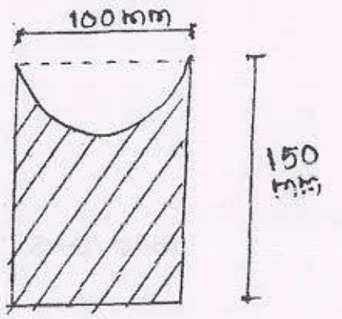


Fig. 4.1

Q5) a) Explain S-t, V-t and a-t curves. [6]

b) An elevator cage of mine shaft weighing 15 KN when empty is lifted or lowered by means of wire rope. Once man weighing 900 N entered in it and moving down with uniform acceleration such that when distance of 250 m was covered. The velocity of the cage 30 m/s. Determine the tension in the rope and force exerted by the man on the floor of the cage. [12]

OR

)6) Attempt any three of the following. [15]

a) Solve the following equations by Gauss-Jordan method
$x+y+z=5; 2x+3y+z=10; 3x-2y+2z=3$.

b) Use Jacobi's iteration method (Three iterations only) to solve
$5x+2y+z=12; x+4y+2z=15; x+2y+5z=20$.

c) Use Gauss-Seidal method (03 iterations) to solve the equations
$x+7y-3z=(-22); 5x-2y+3z=18; 2x-y+6z=22$.

d) Find the largest eigen value of matrix $A=\begin{bmatrix}1 & 6 & 1\\ 1 & 2 & 0\\ 0 & 0 & 3\end{bmatrix}$ by Rayleigh's power method with $x=\begin{bmatrix}1\\0\\0\end{bmatrix}$ as a base vector.

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Total No. of Pages : 4

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F.E. (All Branches) (Part-I) (Semester-I & II) (Revised) Examination, November - 2017
ENGINEERING MATHEMATICS-I
Sub. Code : 59177

Total Marks : 100

y and Date : Monday, 27-11-2017
me : 2.30 p.m. to 5.30 p.m.

structions : 1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

SECTION-I

)1) Attempt any three of the following. [15]

a) Find non-singular matrices P and Q such that PAQ is in the normal form and hence find rank of A where $A=\begin{bmatrix}1 & 2 & 3 & 4\\ 2 & 1 & 4 & 3\\ 3 & 0 & 5 & -10\end{bmatrix}$.

b) Discuss the consistency of the following system of equations and if possible solve them $2x-y-z=2, x+2y+z=2, 4x-7y-5z=2$.

c) Use matrix method to determine the value of λ for which the equations $x+2y+z=3, x+y+z=\lambda, 3x+y+3z=\lambda^2$ are consistent and solve them for any one value of λ.

d) Solve $2x-y+3z=0, 3x+2y+z=0, x-4y+5z=0$, by matrix method.

Q2) Attempt any three of the following. **[15]**

a) Examine for linear dependence of vectors (1,2,–1,0), (1,3,1,2), (4,2,1,0), (6,1,0,1) and find a relation between them if dependent.

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P.T.O.

b) Determine the Eigen values and Eigen vector corresponding to greatest Eigen value only, for $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$.

c) Find the Eigen values of matrix $A=\begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$. Hence find Eigen values for A^4, A^{-1}, $5A$ by using properties of eigen values.

d) Verify Cayley Hamilton theorem for $A=\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$.

Q3) Attempt any four of the following. **[20]**

a) Simplify $\dfrac{(\cos 5\theta - i\sin 5\theta)^2(\cos 7\theta + i\sin 7\theta)^{-3}}{(\cos 4\theta - i\sin 4\theta)^9(\cos\theta + i\sin\theta)^5}$.

b) Find all the values of $\left(\dfrac{1}{2}+i\dfrac{\sqrt{3}}{2}\right)^{\frac{1}{4}}$.

c) Prove that $\tanh^{-1}x=\dfrac{1}{2}\log\left(\dfrac{1+x}{1-x}\right)$.

d) Express $\dfrac{\sin 7\theta}{\sin\theta}$ in powers of $\sin\theta$ only.

e) Prove that $\left(\dfrac{\cosh x+\sinh x}{\cosh x-\sinh x}\right)^n=\cosh 2nx+\sinh 2nx$.

f) Express $\cos^{-1}\left(\dfrac{3i}{4}\right)$ in the form (a + ib).

SECTION-II

Q4) Attempt any three of the following. **[15]**

a) Expand $e^{x\cos x}$ in powers of x upto x^4 term.

b) Use Maelaurin's series to expand function $\tan\left(\dfrac{\pi}{4}+x\right)$ in a ascending power of x.

c) Use Taylor's series to find $\left(\sqrt{25.15}\right)$ correct upto four decimal places.

d) Evaluate $\lim\limits_{x\to 1}\left[\dfrac{x-x^x}{1+\log x-x}\right]$.

Q5) Attempt any four of the following. **[20]**

a) If $u=\log(x^3+y^3-x^2y-xy^2)$ then prove that $\left(\dfrac{\partial}{\partial x}+\dfrac{\partial}{\partial y}\right)^2 u=\dfrac{-4}{(x+y)^2}$.

b) If $u=\dfrac{1}{2}\log(y^2-x^2)$ then find the value of $\left(x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}\right)$.

c) If $u=xyz$; $v=x^2+y^2+z^2$; $w=(x+y+z)$ then find $J\left(\dfrac{u,v,w}{x,y,z}\right)$.

d) Find the minimum and maximum values of $(x^3+3xy^2-3x^2-3y^2+4)$.

e) If power P is given by $P=\left(\dfrac{E^2}{R}\right)$. Find the approximate percentage error in power P if E is increased by 3% and R is decreased by2%.

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Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester - I & II) (New)

Examination, November - 2017

ENGINEERING PHYSICS

Sub. Code: 59176

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Given:- Avogadro's number = 6.02×10^{26}/kg.atom
Planck's constant h = 6.63×10^{-34} J.s
Electronic charge e = 1.6×10^{-19} C
Electron mass m=9.1×10^{-31} kg

SECTION - I

Q1) Attempt Any Three from the following questions.

a) What is grating? Give theory of plane transmission grating for normal incidence. **[6]**

b) Explain construction and working of Laurent's half shade polarimeter. **[6]**

c) i) What is double refraction? **[3]**

ii) A tube of sugar solution 20 cm long is placed between crossed Nicols and illuminated with a monochromatic light. If the optical rotation produced is 13° and specific rotation is 65°dm/g/cm^3, determine the concentration of the solution. **[2]**

d) A grating has 6000 lines per cm on it. Its width is 10cm, calculate

i) the resolving power in the second order and

ii) the smallest wavelength that can be resolved in the third order in 6000 Å wavelength. **[5]**

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P.T.O.

Q2) Attempt Any Three from the following questions.

a) With neat diagram explain construction and working of ruby laser. [6]

b) Discuss industrial and medical applications of laser. [6]

c) Explain the advantages of optical fiber. [5]

d) With suitable diagram explain the terms : acceptance angle, acceptance cone and Numerical aperture of an optical fiber. [5]

Q3) Attempt Any Three of the following questions.

a) What is nuclear reactor? Explain various features used in the classification of a Nuclear reactor. [6]

b) Calculate the power output of a nuclear reactor which consumes 50gm of U^{235} Per day. Assume 5% reactor efficiency. Given: Energy released per fission of U^{235} Is 200MeV. [5]

c) What do you mean by thermonuclear reactions? Give proton-proton chain reaction. [5]

d) Write note on fusion power reactor. [5]

SECTION - II

Q4) Attempt Any Three from the following questions.

a) Find the number of atoms per unit cell, the coordination number and the atomic radius of BCC lattice. [6]

b) What are Miller Indices? How are they determined?
Draw the planes in cube (111) and (110) [6]

c) Explain the terms unit cell and their types. [5]

d) i) Explain the centre of symmetry. [2]

ii) A beam of X-rays of wavelength 0.71 Å is diffracted by (110) plane of rock salt with lattice constant of 2.8 Å. Find the glancing angle for the second order diffraction. [3]

Q5) Attempt Any Three from the following questions.

a) Discuss de-Broglie's concept of matter waves. Find an expression for the de-Brogile wavelength associated with a particle accelerated through a potential difference 'V' volts. [6]

b) What is Compton Effect? Explain experimental arrangement used to study Compton Effect. Write the formula for Compton Shift. [6]

c) State and explain Heisenberg's uncertainity principle. [5]

d) i) State properties of matter wave. [2]

ii) Determine the velocity and kinetic energy of a neutron having de-Broglie wavelength 1.0 Å. Mass of neutron is 1.67×10^{-27} kg. [3]

Q6) Attempt Any Three from the following questions.

a) With neat diagram explain construction and working of Atomic Force Microscope. [6]

b) Explain the electrical, magnetic and mechanical properties of nanomaterials. [5]

c) What are different types of the CNT? Explain any two properties of CNT in detail. [5]

d) Explain the ball milling method for getting nano particles. [5]

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SF-4

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester - I & II) (Revised) Examination, November - 2017

BASIC ELECTRICAL ENGINEERING

Sub. Code : 59178

Day and Date : Thursday, 09-11-2017 **Total Marks : 100**

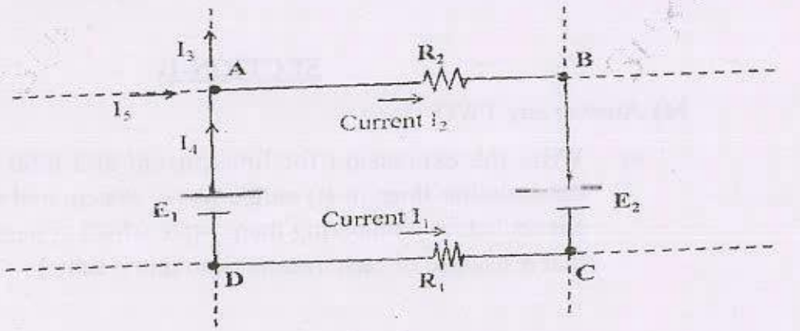
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled diagrams as a part of explanation.**
4) **In case of any missing data, assume suitable value. State it clearly.**

SECTION-I

Q1) Answer any TWO: **[2×9=18]**

a) State Kirchhoff's laws. Write KCL and KVL equations for node A and loop ABCDA in following circuit. Explain the sign rules used while writing your equations.



b) Derive an expression for Magneto motive force of a series magnetic circuit having three different magnetic materials. Draw equivalent electrical circuit and equivalent expression for the same.

c) An electric toaster has rating 1000 W, 240V. Find its resistance. The toaster is connected to 220V supply instead of the rated voltage. Now calculate current & power taken at 220V. If toaster works for 5 minutes, Calculate the cost of energy at Rs. 4/KWh.

P.T.O.

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Q2) Answer any TWO: **[2×9=18]**

a) Derive the mathematical expression for average value of sinusoidal AC by analytical method. Mention one application where average value of AC is important.

b) Define power factor in AC system. State causes and drawbacks of low power factor.

c) If a single phase series A.C. circuit has applied voltage $v = 100 \sin(wt + 20°)$ volt and current $i = 15 \sin(wt + 60°)$ ampere

Determine - Impedance, phase difference, power factor, Resistance, Reactance, Power.

Q3) Answer any TWO: **[2×7=14]**

a) Draw and explain working of single phase induction type energy meter.

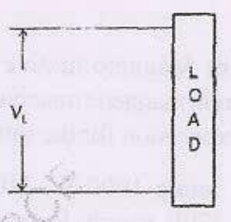
b) State the importance of earthing in electrical installation. Explain with neat sketch any one earthing method.

c) Draw circuit diagram and explain the operation of fluorescent tube working on sinusoidal AC voltage. State its advantages as compared to incandescent bulb.

SECTION-II

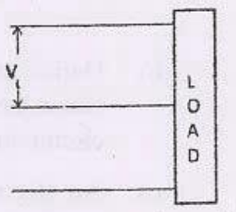
Q4) Answer any TWO: **[2×7=14]**

a) Write the expression for line current and total I^2R power loss in transmission lines in (i) single phase system and (ii) 3 phase system shown below. Comparing them, state which system is better. (Assume that resistance of each transmission line is same)



Load takes power P

Pf of load = cos Φ



Load takes power P

Pf of load = cos Φ

b) Draw circuit diagram for (i) star connected circuit (ii) delta connected circuit. Show line voltage, phase voltage, line current, phase current on each diagram. For each circuit, write the relation between (1) line voltage and phase voltage (2) line current and phase current.

c) Define and explain

i) balanced 3 phase supply

ii) phase sequence

iii) balanced 3 phase load

Q5) Answer any TWO: **[2×9=18]**

a) List the advantages of rotating field alternator as compared to rotating armature alternator. Why slip rings-brushes are required in an alternator?

b) Explain the working of transformer with load. Draw suitable diagrams.

c) Two windings of a transformer have 1000 turns and 500 turns. It is used as a step up transformer with 200 V ac supply and 0.8 pf load. The load current is 5A. Find (i) secondary voltage (ii) primary current (iii) the copper loss at this load, (iv) efficiency of transformer at this load,. Given: Iron loss of the transformer = 30W, Copper loss of the transformer at 1A load current is 3W.

Q6) Answer any TWO: **[2×9=18]**

a) State important features of universal motor. What are the disadvantages due to commutator?

b) List the differences between split phase induction motor and shaded pole induction motor? With reasons state which of the above motors is preferred for (i) compressor (ii) sound recording instrument.

c) Explain the working of split phase induction motor. Draw suitable diagrams.

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SF-6

Total No. of Pages : 3

Seat No.	

First Year Engineering (All Branches) (Semester - II) (New)

Examination, November - 2017

BASIC CIVIL ENGINEERING

Sub. Code :59179

Day and Date : Tuesday, 14- 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumptions wherever necessary and mention it clearly.**
4) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) a) Explain significance of branches of Civil Engineering. **[8]**

OR

a) Enlist various principles of building planning. Explain Privacy, Sanitation in detail. **[8]**

b) Write short note on orientation of building. **[4]**

c) Write down the specific Bye Laws for, **[4]**

i) Open space requirement

ii) FSI

Q2) Answer the following. **[18]**

a) Differentiate between:

i) Uniform and differential settlement

ii) Shallow and Deep foundation

b) Explain with neat sketch functions of different elements of substructure and superstructure.

c) What is deep foundation? Explain pile foundation with neat sketch.

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3) a) Write short note on [8]

i) Different roofing materials.

ii) Types of cement with their properties.

OR

a) Differentiate between [8]

i) load bearing and framed structures.

ii) RCC steel and structural steel

b) What are the characteristics of good brick? [4]

c) Write uses of plastic as a Building material. [4]

SECTION - II

4) a) Classify surveying on the basis of instruments used? Explain the principles on which surveying works. [4]

b) State & Explain in detail Principle of Optical Square. [4]

c) The distance between two villages was measured with a 20 m chain and was found to be 2719 m. The same distance was measured with 30 m chain and was found to be 13,600 links. The test shows that both chains were incorrect. What correction is required in the 20 m chain, if the 30 m chain is 0.5 links too long? [8]

OR

Observed bearings for a closed compass traverse are given below. Find the local attraction at each end of the affected station and correct all bearings. Tabulate the data and results. Find also included angles. Show all calculations. [8]

Line	PQ	QR	RS	ST	TP
F.B	N 48° W	N 9° E	S 83° E	S 15° E	S 64° W
B.B	S 50° E	S 7° W	N 80° W	N 15° W	N 65° E

5) a) Attempt any Two questions from following

i) How planimeter is used for measuring areas of irregular figures? [4]

ii) Differentiate between Rise & fall method and collimation plane method. [4]

iii) Explain characteristics of contours with neat sketch. [4]

b) The following staff readings were observed on a continuously sloping ground with the help of a dumpy level and 4m staff at 30 m interval. The last reading was taken on B.M. of RL 240.120 m.

0.420, 1.660, 2.880, 0.580, 1.385, 2.270, 2.995, 3.800, 0.625, 2.365, 3.225, 3.630.

Enter the readings in a page of level book. Find R.L.s by Rise and Fall method. Apply usual checks. Determine longitudinal gradient. [10]

6) a) Differentiate between rigid and flexible pavement. [4]

b) Explain the components of railway track (Broad gauge). [4]

c) State the types of dams. Explain gravity dam with neat sketch. [4]

d) Explain with neat diagram functions of units in water treatment plant. [4]

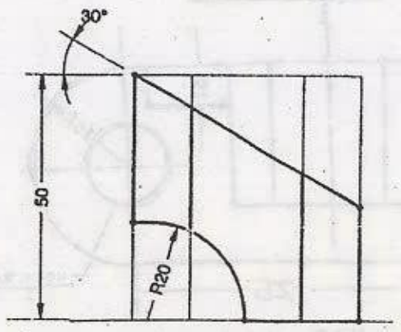
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Q6) Solve any one.

a) Solve.

i) A right circular cone of base dia. 50mm & axis 70mm stands on HP. It is cut by AVP which makes an angle 60° to VP & 8mm away from axis. Draw SFV, TV & true shape of section. [7]

ii) Figure shows FV of hexagonal prism with two cutting planes. Complete the development of lateral surfaces of prism. [6]



OR

b) Solve

A pentagonal base pyramid with base side 25mm & height 50mm is resting on HP. With one of its base edge perpendicular to VP. It is cut by section plane 45° to HP & passing through its RHS corner. Draw FV, sectional TV, and true shape of section also development of remaining part of pyramid. [13]

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Total No. of Pages : 4

Seat No.	

F. E. (All Branches) (Part - I) (Semester - I & II) (Revised)

Examination, November - 2017

ENGINEERING GRAPHICS

Sub. Code : 59180

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 06.30 p.m.

Instructions :
1) **Assume suitable data if necessary.**
2) **Use both sides of drawing paper.**
3) **All dimensions are in mm.**
4) **All questions are compulsory.**

SECTION - I

Q1) Solve any two : [12]

a) Construct hyperbola having focus 70 mm away from directrix and eccentricity 4/3. Also draw a tangent & normal at any point P on curve.

b) To construct an Archimedean spiral of two revolutions, given the greatest & shortest radius is 100mm & 10mm resp.

c) A circle of 50mm diameter rolls on horizontal line for half revolution clockwise and then on a vertical line for another half revolution. Draw the curve traced out by a point 'P' on base of circumference of circle.

Q2) a) Solve any three. [12]

i) Complete the projections of line AB having its TL is 60mm, bearing of S60E & FV makes an angle 30° to HP. (Ref. Fig. 1 (i))

ii) Find angle between line AB & CD. (Ref. Fig. 1 (ii))

iii) Line AB is parallel to line CD having true length 50 mm. Complete the projections of line CD. (Ref. Fig. 1 (iii))

iv) Find angle made by plane PQR with HP and VP. (Ref. Fig. 1 (iv))

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b) Solve. [13]

A triangular Plate ABC, AB = 60 mm, BC=45 mm and AC=30mm has its longest side in VP and inclined at 30° to HP. Draw its projections if its surface is inclined at 45° to the VP.

Q3) Solve. [13]

A right circular cylinder with 50mm dia. & height 70mm rest on Hp. Such that the base is inclined at 60° to HP & its axis is inclined 45° to VP. Complete projections of cylinder.

SECTION -II

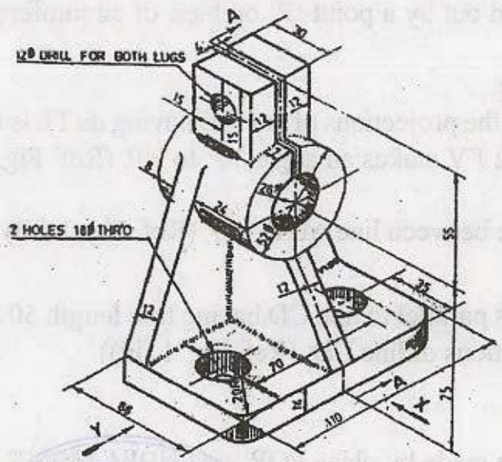
Q4) Solve. [24]

The following figure shows a bracket. Draw the following views:

a) FV from X direction

b) TV&

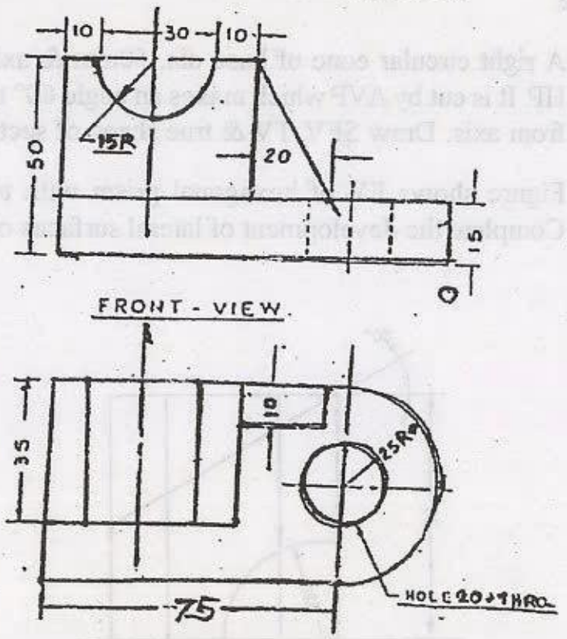
c) Sectional LHSV along section AA.



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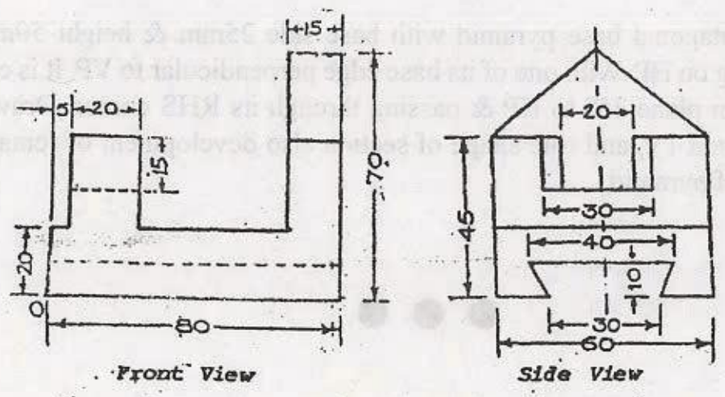
Q5) Solve any one. [13]

a) Figure shows the views. Draw its isometric view.



OR

b) Figure shows the views. Draw its isometric view. [13]



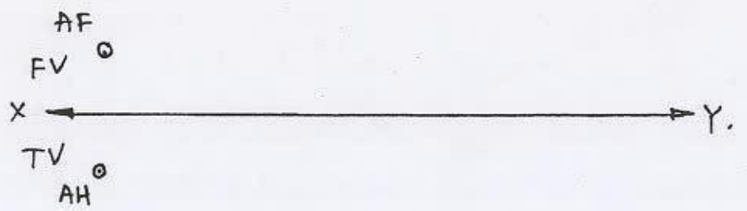


Fig 1 · (i)

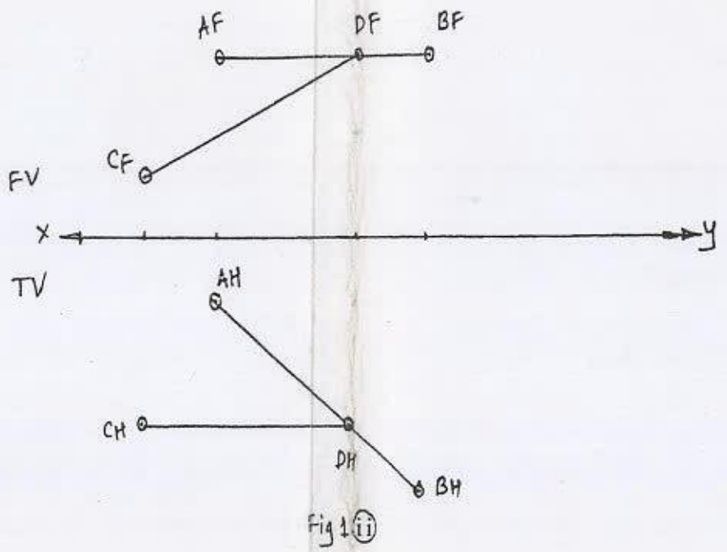


Fig 1 (ii)

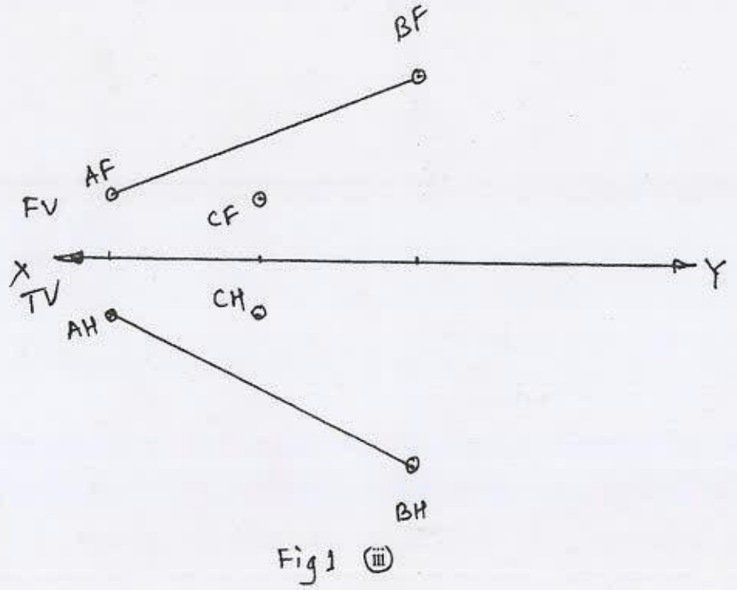


Fig 1 (iii)

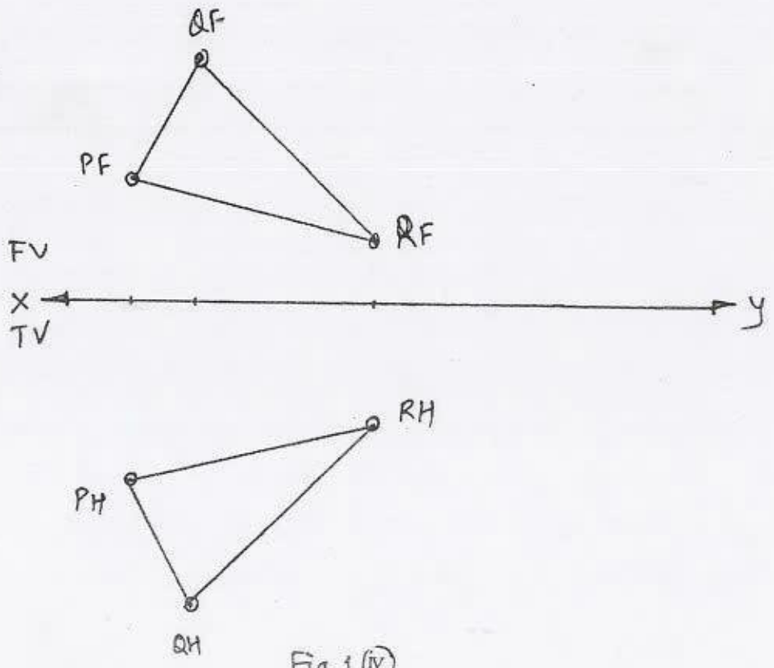


Fig 1 (iv)

Q.No.	1	2	3	4	5	6	Signature of the Examiner
Marks							

Sr. No. | Signature of Jr. Supervisor

Examination : _____ Paper No. _____ Section _____

Subject | Code No.

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Name of Exam : _____ | Code No.

Paper No. _____ Section _____

Seat No. _____ Centre _____

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Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester- I & II) (Revised)
Examination, November - 2017
ENGINEERING CHEMISTRY
Sub. Code : 59183

Day and Date : Tuesday, 07-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary.**
3) **Draw neat labeled diagram wherever necessary.**
4) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) A sample of water on analysis was found to contain the following salts: **[8]**

Salt	Salt mass in mg/lit.	Mol. Wt.
$Ca(HCO_3)_2$	26.2	162
$Mg(HCO_3)_2$	21.9	146
$CaCl_2$	23.0	111
$MgSO_4$	36.0	120
NaCl	28.5	58.5

Calculate temporary, permanent and total hardness of sample in degree French.

b) Solve any two questions: **[10]**
i) What are the advantages and disadvantages of instrumental methods of analysis?
ii) Explain properties and applications of ERP.
iii) Explain reverse osmosis process for purification of water.

Q2) a) Explain the principle, construction and working of glass electrode. **[6]**

b) Solve any TWO of the following: **[10]**
i) What is scale and sludge formation? Explain mechanism of scale formation.
ii) Give preparation, properties and applications of Bakelite.
iii) What are composite materials? Explain the characteristics of composite materials.

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)3) Solve any four of the following: [16]

a) Write the applications of gas chromatography.

b) What is Dissolved Oxygen of water? Explain in detail.

c) State and derive an equation for Lambert's law.

d) Explain any four applications of nanomaterials.

e) Explain the addition and condensation polymerization reaction with suitable example.

f) Write note on acidity of water.

SECTION-II

)4) a) Solid fuel weighing 1.097gm and containing C = 90.7%, H = 6.7% and ash = 2.6%. Have the following results in the Bomb calorimeter experiment:

Water equivalent of calorimeter = 1230gm, Amount of water taken = 3376gm,

Initial temp. of water= 27.6°C, Correction due to acids = 68.7 cal.,

Cooling correction = 0.066 °C, Final temp. of water = 33.9°C,

Correction due to fuse wire = 9.0cal.

Calculate the gross and net calorific values of the solid fuel in Joule.[8]

b) Attempt any two questions: [10]

i) What is corrosion? Explain chemical corrosion with suitable diagram.

ii) How will you determine calorific value of liquid fuel?

iii) What is an alloy? Explain the purposes of alloying with suitable example.

)5) a) What are non ferrous alloys? Explain the nickel alloy giving their composition, properties and uses. [6]

b) Solve any two of the following: [10]

i) Compare of liquid fuel between gaseous fuels.

ii) Describe hydrogen evolution mechanism in wet corrosion with suitable diagram and reactions.

iii) Explain the factors influencing on the rate of corrosion.

)6) Answer of the following four questions: [16]

a) Explain in detail any four characteristic of a good fuel.

b) Discuss the importance of design in controlling corrosion.

c) Explain any four applications of Fuel Cells in various fields.

d) State composition, properties and uses of Duralumin.

e) Explain process of electroplating for prevention of corrosion.

f) Write short note on green chemistry.

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SF-236

Total No. of Pages : 2

Seat No.	

B.E. (CSE) (Part - IV) (Semester - VII) (Revised)
Examination, November - 2017
DISTRIBUTED SYSTEMS
Sub. Code : 67542

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Question 4 and question 8 are compulsory, attempt any two questions from que.1 to 3 from section I and que. 5 to 7 from section II.**

2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Explain the process of binding a client to a server in DCE RPC. **[8]**

b) What are different scaling techniques can be applied to achieve scalability in distributed system? **[8]**

Q2) a) Explain token ring mutual exclusion algorithm in detail. **[8]**

b) Define the terms error and fault. Classify and explain the faults. **[8]**

Q3) a) Explain UNIX semantics, Session Semantics and Immutable files semantics of file sharing. **[8]**

b) Explain the server replication mechanism used in CODA. **[8]**

Q4) Attempt any three **[18]**

a) Sensor networks.

b) Berkeley Algorithm.

c) Collaborative distributed systems.

d) Compound procedures used in ONC RPC in NFS v4.

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SECTION-II

Q5) a) Describe implementation level of virtualization in Cloud Computing? **[8]**

b) What is the benefits using virtualization in Cloud Computing? **[8]**

Q6) a) Explain virtualization at Application level? **[8]**

b) Explain Database as a Service (DBaaS) in Cloud Computing? **[8]**

Q7) a) What are different threats on Data stored in cloud? **[8]**

b) What are the advantages of "Platform as a Service" (PaaS)? **[8]**

Q8) Write note on **[18]**

a) Advantages of Using cloud storage gateways (CSG).

b) Cloud Firewall.

c) Virtual Firewall.

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Total No. of Pages : 2

Seat No.	

B.E. (CSE) (Part-IV) (Semester-VII) (Revised) Examination, November - 2017
ADVANCED DATABASE SYSTEMS
Sub. Code : 67543

Day and Date : Wednesday, 15-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary.**

SECTION-I

Q1) a) What do you mean by replication and fragmentation w.r.t. distributed database? Briefly explain the advantages and disadvantages to replication. **[8]**

b) What are transaction-server systems? For data server systems, explain the following **[8]**
i) Locking
ii) Data caching
iii) Lock caching

Q2) a) What is an Object Identity? Explain the system-generated OID and the immutability Property of an object. **[8]**

b) What is Persistent object? Explain the approaches to make the Object Persistent? **[8]**

Q3) a) State some of the object database features that have been included in SQL. Also give an example of UDTS in SQL to create complex structured object. **[8]**

b) With the help of an appropriate figure of the database life cycle, explain in detail database initial study phase. **[8]**

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Q4) Write short notes on any three: [18]

a) 2-phase commit

b) ODL

c) Persistence

d) top-down versus bottom-up design

SECTION-II

Q5) a) Explain the intuition behind the two rules in the Bell-LaPadula model for manadatory access control. [4]

b) Give an example of how covert channels can be used to defeat the Bell-LaPadula model. [4]

c) Explain the statistical database security. [8]

Q6) a) Explain document type definition. Describe a DTD with suitable example for an XML. [8]

b) Write the applications of XML. [4]

c) What is Xquery? Explain FLOWR expression with example? [4]

Q7) a) What is data warehouse? What is the difference between data warehouse and operational database system? [6]

b) Explain Following [4]

i) Data cube

ii) OLAP

c) With neat schematic explain business intelligence architectural components? [6]

Q8) Write a short note on(any three) [18]

a) Polyinstantiation

b) XML schema

c) Classification algorithm

d) Grant and Revoke with example.

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Total No. of Pages : 3

Seat No.	

B.E. (Computer Science and Engineering) (Semester-VII) Examination, November - 2017

MOBILE APPLICATIONS (El. - 1)

Sub. Code : 67546

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m to 5.30 p.m.

Instructions :
1) **Figures to the right indicates full marks.**
2) **Question no 4 and 8 are compulsory**
3) **Attempt any two questions from remaining questions in each section**

SECTION - I

Q1) a) What are mobile website navigatation techniques **[6]**

b) What is native app, hybrid app and web app in mobile app technology stack. **[6]**

c) Explain about standard OMA. **[4]**

Q2) a) Write a note on HTML 5. **[6]**

b) Explain in detail about WAP 1.0 **[6]**

c) Write short note on Web Services **[4]**

Q3) a) Explain the difference between XML and JSON **[6]**

b) What are the best practices while designing a mobile website? **[6]**

c) Explain in detail about Fallback mechanism. **[4]**

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Q4) Write short note on (Any Three) **[18]**

a) Android emulator

b) W3C

c) RESS

d) Tools for Mobile Web Development

SECTION - II

Q5) a) Explain the role of responsive images in mobile application development How we can use Sencha. IO to create responsive images **[6]**

b) Explain various problems mobile application developer face regarding feature support on a particular platform. Briefly describe their solutions. **[6]**

c) Describe how we can use HTTP header for device detection at server side **[4]**

Q6) a) Explain in detail JavaScript APIs for handling touch and gesture events in mobile application **[6]**

b) Compare Zepto.js with jQmobi. **[6]**

c) What is J2ME? How are the tools available for J2ME programming? **[4]**

Q7) a) Describe how W3C Geolocation API is used for getting a location as well as tracking a particular location. **[6]**

b) Compare Native App And Mobile Web App. **[6]**

c) List various JavaScript mobile UI patterns. Explain ANY one. **[4]**

Q8) Write a short note on (any three) **[3×6=18]**

a) Web Sockets.

b) Device Interaction.

c) GSMA One API.

d) HTTP Sniffing.

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Total No. of Pages : 2

Seat No.	

B.E. (Computer Science & Engg.) (Semester - VIII) (Revised) Examination, November - 2017

DATA ANALYTICS

Sub. Code : 67824

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Q.4 & Q.8 are compulsory.**
3) **Attempt any two questions from Q.1, to Q.3 and from Q.5 to Q.7.**

Q1) a) Explain the phases in the developments of Business Intelligence System with the help of neat diagram? **[8]**

b) Explain Star Schema, Snowflake Schema, Galaxy Schema with proper example? **[8]**

Q2) a) Explain different categories of mathematical models for decision making? **[8]**

b) Explain in detail process of univariate analysis? **[8]**

Q3) a) Explain HDFS Architecture and the working of Hadoop Heartbeat message in HDFS with proper figure? **[8]**

b) Explain data validation process in data preparation. **[8]**

Q4) Write a note on (Attempt Any Three) : **[18]**

a) Data Warehouse Architecture.

b) Hive, HBase, Pig & Pig Latin.

c) Multivariate Analysis.

d) Data mining tasks.

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Q5) a) Explain simple linear regression model and structure of regression model. **[8]**

b) Discuss the structure and phases of the learning process for a classification with a neat diagram. **[8]**

Q6) a) Explain in detail any one algorithm used for partition methods. **[8]**

b) Explain the general association rules that is useful for range of applications. **[8]**

Q7) a) List and explain the different functions to handle the data in R workspace with an example. **[8]**

b) List and explain the various types of R commands to import data. **[8]**

Q8) Write a short note on (Any Three) : **[18]**

a) Bayesian methods.

b) Exporting data from R.

c) Hierarchical clustering methods.

d) Apriori algorithm.



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Total No. of Pages :2

Seat No.	

B.E. (Computer Science) (Semester - VIII) (Revised) Examination, November - 2017
REAL-TIME OPERATING SYSTEM
Sub. Code:67826

Day and Date :Friday, 03 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions : 1) **Solve Any Three Questions from each section.**
2) **Figures to right indicate full marks.**

SECTION-I

Q1) a) What is Real-Time System? Explain Real-time system examples. **[8]**

b) Explain following terminologies related to hardware interfacing: **[8]**

i) Latching

ii) Edge vs Level Triggered

iii) Tristate logic

iv) IEEE 1394 Firewire

Q2) a) Explain memory-mapped I/O with suitable diagram. **[8]**

b) Explain operation of mailboxes? How critical section problem can be handled using mailboxes? **[8]**

Q3) a) What is priority inversion ? Explain priority ceiling protocol. **[8]**

b) Explain task control block model in detail. **[8]**

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Q4) Write a note on- (Any Three) **[18]**

a) Polled loop

b) Test-and-Set-Instruction

c) Watchdog timers

d) Ring Buffers

SECTION -II

Q5) a) Explain requirement engineering process in desing of real time systems. **[8]**

b) What are formal methods in software specification? State its limitations. **[8]**

Q6) a) Explain how to organize the requirements document. **[8]**

b) What is COCOMO? Explain COCOMO-II in detail. **[8]**

Q7) a) Explain real-time features of C# and Java. **[8]**

b) Explain semaphore and mutex management in RTLinux. **[8]**

Q8) Write a note on-(Any Three) **[18]**

a) Mc Cabe's Metric

b) Function points

c) RTLinux

d) Assembly language

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Total No. of Pages : 2

Seat No.	

B.E. (Computer Science and Engg.) (Semester-VIII)
(Revised) Examination, November - 2017
SOFTWARE TESTING AND QUALITY ASSURANCE
(Elective-II)
Sub. Code : 67828

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **Q. 4 and Q. 8 are Compulsory.**
2) **Attempt any two questions from Q. 1 to Q. 3.**
3) **Attempt any two questions from Q. 5 to Q. 7.**

SECTION-I

Q1) a) What is software testing? Why should we test? **[8]**

b) Explain V shaped software lifecycle model. **[8]**

Q2) a) What are different software verification methods? **[8]**

b) What do you mean by software project audit? Explain in brief project audit and review checklist. **[8]**

Q3) a) Explain use cases and use case diagram in detail? **[8]**

b) What is regression testing? **[8]**

Q4) Write a note on (Any two): **[18]**

a) Software failures with example.

b) SRS document verification.

c) Risk analysis.

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SECTION-II

Q5) a) Which are broad categories of software metrics? Explain in detail. **[8]**

b) Compare client server application and web based application. **[8]**

Q6) a) What should we measure during testing? **[8]**

b) Write a note on user interface testing. **[8]**

Q7) a) Which are the several problems with the function points measure? **[8]**

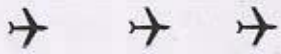
b) What is automated test data generation.? **[8]**

Q8) Write a note on (Any two): **[18]**

a) Measurement in software engineering.

b) Albretch's approach.

c) Security testing.



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Total No. of Pages : 2

Seat No.	

B.E. (Computer Science & Engg.) (Semester - VIII) (Pre-revised) (Old) Examination, November - 2017

GRID TECHNOLOGY

Sub. Code : 49447

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Q.4 & Q.8 are compulsory.**
2) **Attempt any two questions from Q.1, Q.2, Q.3.**
3) **Attempt any two questions from Q.5, Q.6, Q.7.**
4) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) With schematic explain basic structure of GT3 and their base services. **[8]**

b) What is grid computing? What are the types of grid computing? Explain different topologies of grid computing? **[8]**

Q2) a) Explain semantic workflow enactment in geodise. **[8]**

b) What is autonomic computing? Explain the features of autonomic computing? **[8]**

Q3) a) What is RDF? Why RDF is essential in GRID? Explain RDF data model. **[8]**

b) Define web service and explain the structure of soap and wsdl. **[8]**

Q4) Write a short note on (Any Three) : **[18]**

a) Grid related standard bodies.

b) Portal Lab.

c) RPC.

d) OGSA and OGSI.

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SECTION - II

Q5) a) Explain the role of directory service, producer and consumer in GMA? **[8]**

b) With neat schematic explain different daemons in condor pool. **[8]**

Q6) a) Explain cloud deployement models? Discuss about pros and cons cloud computing? **[8]**

b) What is virtualization? What are the characteristics of virtualization? Explain foundational issues of virtualization. **[8]**

Q7) a) What is storage as a service provider? Explain different aspects of data security. **[8]**

b) Explain Job life cycle and Job Management in Codor. **[8]**

Q8) Write a short note on (Any Three) : **[18]**

a) SOA.

b) Credential delegation & single sign-on.

c) Client Desktop.

d) Scheduling Paradigms.

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Total No. of Pages : 2

Seat No.	

T.E. (Computer Science & Engineering) (Semester-V) (Revised) Examination, November - 2017

COMPUTER GRAPHICS (Theory)

Sub. Code : 66293

Day and Date : Thursday, 09-11-2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Q. No. 3 and Q. No. 6 are compulsory. Attempt any one from Q. No. 1 and Q. No. 2 and any one from Q. No. 4 and Q. No. 5.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) a) What is scaling? Explain in detail 2D scaling transformation. **[6]**

b) Write and explain Bresenham's line drawing algorithm in first octant. **[6]**

Q2) a) Explain in detail the rotation of object about the arbitrary axis in space. **[6]**

b) Explain Run Length Encoding (RLE) scan conversion method. **[6]**

Q3) a) Explain midpoint subdivision algorithm for line clipping with example. **[7]**

b) Write a note on windowing and view porting. **[6]**

Q4) a) Explain parametric representation of cubic spline curve segment. **[6]**

b) What is key frame animation? Explain different methods of key frame animation. **[6]**

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Q5) a) Explain diffuse reflection model for calculating surface intensity at a given point. **[6]**

b) What is halftoning. Explain halftone approximation method for a 3 by 3 pixel grid on a bilevel system. **[6]**

Q6) a) Explain Warnock algorithm for hidden surface removal. **[7]**

b) What is warping? Explain feature-based image warping method. **[6]**

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Total No. of Pages :2

Seat No.	

T.E. (Computer Science and Engg.) (Semester - V) Examination, November - 2017

SYSTEM PROGRAMMING

Sub. Code: 66294

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Question No. 4 and 8 are compulsory.**
2) **Answer any two questions from Question No. 1, 2 and 3.**
3) **Answer any two questions from Question No. 5, 6 and 7.**
4) **Figures to right indicate full marks.**

Q1) a) Explain the fundamentals of language specification. **[8]**

b) Explain Pass I of a two pass assembler. **[8]**

Q2) a) State and discuss the advanced macro facilities with an example each. **[8]**

b) Discuss language processing activities in detail. **[8]**

Q3) a) List and discuss elements of assembly language programming **[8]**

b) Explain different data structures of the macro preprocessor with its contents in detail. **[8]**

Q4) Write a short note on (6 marks each): **[18]**

a) Macro Expansion.

b) Intermediate Code Forms.

c) LEX and YACC LPDT's.

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Q5) a) Explain use of Interpreters. What are Pure and Impure Interpreters? **[8]**

b) Explain code optimization in compilation. Brief about Local and Global code optimization. **[8]**

Q6) a) Give the Structure of UI with neat diagram. **[8]**

b) Write and Explain Linking Algorithm. **[8]**

Q7) a) Explain about the Tools used in Enhancement of Program Performance. **[8]**

b) What is Command Dialog? Explain ways to implement Command Dialogs. **[8]**

Q8) Write a short note on: (Solve any three: each carries 6 marks.) **[18]**

a) Program Development.

b) Two passes of Linker.

c) Program Relocation.

d) Memory Allocation in Compilers.

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Total No. of Pages : 2

Seat No.	

T.E. (Computer Science and Engineering) (Part - III) (Semester-V) (Revised) Examination, November - 2017

OBJECT ORIENTED MODELING AND DESIGN (Theory)

Sub. Code : 66295

Day and Date : Tuesday, 14-11-2017 Total Marks : 50

Time : 9.30 a.m. to 11.30 a.m.

Instructions : 1) All the questions are compulsory, Provided internal options in each question.

2) Figures to the right indicate full marks.

Q1) Attempt any two questions out of three. [7 × 2 = 14]

a) Explain OMT models in detail.

b) Explain the following terms

i) State generalization

ii) Control Flows

c) Write note on - Design associations

Q2) Attempt any two questions out of three. [6 × 2 = 12]

a) Explain the following terms.

i) Generalization

ii) Class Descriptors

b) Draw and explain Event trace diagram for ATM Scenario.

c) Explain the impacts of Object Oriented Approach.

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Q3) Attempt any two questions out of three. **[6 × 2 = 12]**

a) Explain Structural things of UML.

b) Explain kinds of events with respect to behavioural modeling.

c) Explain deployment diagram, its contents and uses.

Q4) Attempt any two questions out of three. **[6 × 2 = 12]**

a) Explain class diagram, its properties, contents and common uses.

b) Explain following terms with respect to activity diagram.

i) Action states

ii) Transitions

iii) Branching

c) Write a note on - frameworks.

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Total No. of Pages : 2

Seat No.	

T.E. (CSE) (Semester - V) (Revised) Examination, November - 2017
NETWORK TECHNOLOGIES
Sub. Code : 66297

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Question Number One is compulsory.**
2) **Attempt any THREE questions from Question No. TWO to FIVE.**
3) **Figures to the right indicate full marks.**
4) **Assume data wherever necessary.**

Q1) a) Explain issues in designing a MAC protocol for AD HOC Wireless Networks. **[6]**

b) Explain FCCH and SCH channels in GSM operation. **[4]**

c) What is VPN? Explain VPN protocols. **[4]**

Q2) a) What is GSM? Explain the role of HLR and VLR in GSM service operations. **[6]**

b) What is Handoff operations? Explain inter BSC handoff. **[6]**

Q3) a) What is WLAN? Explain various standards in WLAN defined by IEEE. **[6]**

b) Explain sensor network node architecture. **[6]**

Q4) a) Draw and explain Bluetooth piconet architecture. **[4]**

b) Explain WEP protocol. **[4]**

c) How sensor network is useful in environmental monitoring. **[4]**

Q5) a) What is location updating in GSM. Explain various steps involved in normal location updating. **[6]**

b) Compare WLAN and WPAN networks. **[3]**

c) Explain necessity of security in wireless network. **[3]**

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Total No. of Pages : 2

Seat No.	

T.E. (Computer Science and Engineering) - II (Semester - VI) Examination, November - 2017

OPERATING SYSTEM - II

Sub. Code : 66859

Day and Date : Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Solve any two questions from Q.1 to Q.3.**
3) **Solve any two questions from Q.4 to Q.6.**

Q1) a) Explain the architecture of UNIX System Kernel. **[8]**

b) Explain scenarios for retrieval of a buffer from the buffer cache. **[10]**

c) What is Inode? List Fields from disk inode. **[7]**

Q2) a) Calculate the Maximum size of a file in the UNIX system, if disk block size is 512 byte and a block is identified by 32 bit integer. **[8]**

b) What is remembered inode? How is it useful in inode assignment to a file? **[8]**

c) Explain Following System calls: **[9]**

i) Open.

ii) Read.

iii) Pipe.

Q3) a) Explain the use of User File Descriptor Table, File Table and Inode Table in UNIX File system. **[8]**

b) Explain bwrite algorithm. **[7]**

c) What is Super Block? List fields from the Super Block. **[5]**

d) Explain the structure of a directory file in UNIX. **[5]**

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Q4) a) Explain the context of a process. **[8]**

b) Explain the process state transition in UNIX. **[8]**

c) Explain the algorithm for handling the interrupt. **[9]**

Q5) a) What is a signal? Explain checking and handling of the signal. **[8]**

b) Explain the real and effective user ID of a process. **[9]**

c) Explain the process scheduling parameters in UNIX. **[8]**

Q6) a) Explain allocation of Swap space. **[8]**

b) Explain page stealer process. **[8]**

c) Explain switch table in device driver interface. **[9]**

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Total No. of Pages :2

Seat No.	

T.E. (CSE) (Part -III) (Semester - VI) (Revised) (Theory) Examination, November - 2017
DATABASE ENGINEERING
Sub. Code:66860

Day and Date :Friday, 03 - 11 - 2017 **Total Marks :50**
Time :2.30 p.m. to 4.30 p.m.

Instructions : 1) **All the questions are compulsory. Provided internal options in each question.**

2) **Figures to the right indicate full marks.**

Q1) Attempt any two questions out of three **[2×7=14]**

a) Give advantages and disadvantages of DBMS

b) Write SQL queries to perform given tasks on following schema

Sailors (sid: integer, sname: string, rating: integer, age: real)

Boats (bid: integer, bname: string, color: string)

Reserves (sid: integer, did: integer

i) Find the names of sailors who have reserved at least one boat.

ii) Find the names of sailors who have not reserved a red boat.

iii) Find the name and age of the oldest sailor.

iv) Find the age of youngest sailor who is at least 18 years old.

c) What is functional dependency? Give different types of functional dependencies.

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Q2) Attempt any two questions out of three. **[2×6=12]**

a) Compare database systems with traditional file based systems.

b) Explain different Data Definition Language (DDL) Statements.

c) Explain Third Normal From and Boyce-Codd Normal Form.

Q3) Attempt any two questions out of three. **[2×6=12]**

a) What are the different physical storage media used for data storage?

b) Explain Two-Phase Locking Protocol for Concurrency Control.

c) Explain how records can be organized in files.

4) Attempt any two questions out of three. **[2×6=12]**

a) Compare Dense and Sparse indices

b) Explain Optimistic Concurrency Control Mechanism.

c) Explain Log-based Recovery Mechanism.

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Total No. of Pages : 2

Seat No.	

T.E. (CSE) (Part - II) (Semester - VI) Examination, November - 2017

INFORMATION SECURITY

Sub. Code: 66862

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 50**

Time : 2.30 p.m. to 4.30 p.m.

Instructions :
1) **Q.3 and Q.4 are compulsory.**
2) **Solve any one out of Q.1, Q.2 and Solve any one out of Q.5, Q.6.**
3) **Assume suitable data wherever necessary.**

Q1) a) List & Explain the security services defined in X.800. **[6]**

b) Explain the DES encryption with neat block diagram. **[6]**

Q2) a) Explain the RSA algorithm. Perform encryption & decryption using RSA algorithm **if p=11, q=3, e=11, M=7** **[6]**

b) What is Message Authentication Code? Explain generation of MAC based on DES. **[6]**

Q3) a) Compare **[6]**

i) Symmetric and Asymmetric ciphers

ii) Differential and Linear cryptanalysis

b) Explain Diffie-Hellman key exchange algorithm with example. **[4]**

c) Define the following terms w. r. t Avalanche effect: **[3]**

i) SIC

ii) BIC

iii) GA

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Q4) a) Explain in detail different approaches to Digital Signatures. **[6]**

b) What is certificate format in X.509 standard? **[7]**

Q5) a) Draw general format of PGP message and explain every field of it in detail. **[6]**

b) List types of firewalls. Explain any one in detail. **[6]**

Q6) Write a short note on any two. **[12]**

a) IPSec Authentication Header.

b) SET Participants.

c) Trusted System.

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Total No. of Pages : 3

Seat No.	

T.E. (CSE) (Part - III) (Semester - VI) (New) Examination, November - 2017

STORAGE NETWORKS

Sub. Code : 66861

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt any three questions from each section.**
2) **Figure to the right indicate full marks.**
3) **Assume suitable data wherever necessary.**

SECTION-I

Q1) a) Explain the following in relation with Information Lifecycle. **[8]**

i) Information Lifecycle Management (ILM).

ii) Information Lifecycle Management (ILM) Implementation.

iii) ILM Benefits.

b) The average I/O size of an application is 128 KB. The following specifications are available from the disk manufacturer: average seek time = 2.5 ms, 7,200 RPM, transfer rate = 60 MB/s. Determine the maximum IOPS that could be performed with this disk for this application. Taking this case as an example, explain the relationship between disk utilization and IOPS. **[8]**

Q2) a) Describe SCSI Command Model in direct attached storage. **[8]**

OR

a) Describe Fibre Channel Architecture. **[8]**

b) Explain Benefits of Network Attached Storage[NAS]. **[8]**

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Q3) a) Describe FCIP, FCIP Topology and FCIP Performance and Security. **[8]**

b) An application has 1,000 heavy users at a peak of 2 IOPS each and 2,000 typical users at a peak of 1 IOPS each, with a read/write ratio of 2: 1. It is estimated that the application also experiences an overhead of 20 percent for other workloads. Calculate the IOPS requirement for RAID 1, RAID 3, RAID 5, and RAID 6. **[8]**

Q4) Solve ANY TWO of the following questions.

a) Describe different RAID levels with its advantages and disadvantages. **[9]**

b) Explain Cache component of an Intelligent Storage System with following reference. **[9]**

i) Structure of Cache

ii) Read Operation with Cache

iii) Write Operation with Cache

iv) Cache Implementation

v) Cache Management

vi) Cache Data Protection.

c) Describe Data Center Infrastructure. **[9]**

SECTION-II

Q5) a) Explain Backup and Restore Operations. **[8]**

b) Describe BC Planning Lifecycle. **[8]**

Q6) a) Explain symmetric storage virtualization with its advantages and disadvantages. **[8]**

b) Describe BC Planning Lifecycle in business continuity. **[8]**

Q7) a) Explain Storage Virtualization on various levels of storage network. **[8]**

b) Describe various Backup purpose and backup considerations in storage networks. **[8]**

Q8) Solve ANY TWO of the following questions.

a) Explain Failure Analysis in BC, BC terminology and Business Impact Analysis. **[9]**

b) Explain implementation considerations in Storage virtualization. **[9]**

c) Describe different Backup Granularity and Recovery Considerations. **[9]**



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Total No. of Pages :3

Seat No.	

T.E. (CSE) (Part - III) (Semester - V) (Revised) Examination, November - 2017

COMPUTER ALGORITHMS

Sub. Code: 66296

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

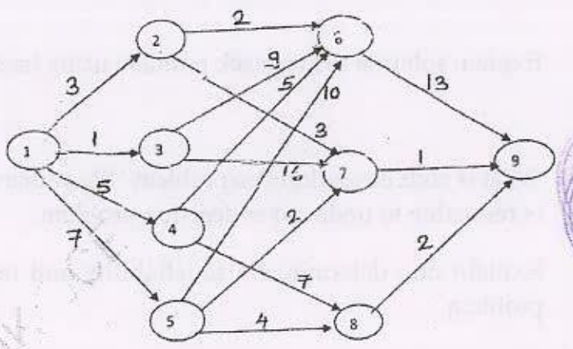
Instructions :
1) **Question No. 4 and 8 are compulsory.**
2) **Attempt any four questions from remaining questions.**
3) **Figures to the right indicate full marks.**
4) **Assume suitable data wherever necessary.**

Q1) a) Explain Job sequencing with deadlines. Also calculate the optimal solution for n=5 jobs, where profits (p1,p2,p3,p4,p5) = (100, 19, 27, 25,15) and deadlines (d1,d2,d3,d4,d5)=(2,1,2,1,3). **[8]**

b) Prove that complexity of quick sort in best case is O(nlogn) and that in worst case is $O(n^2)$. **[8]**

Q2) a) Give solution to Knapsack problem using greedy solution. **[8]**

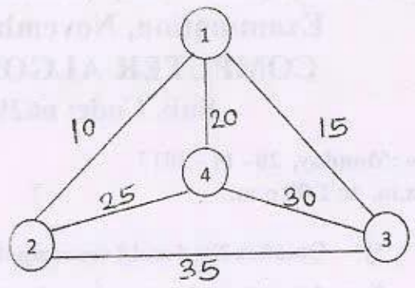
b) Find the minimum cost path from s to t in the multistage graph given below using forward approach. **[8]**



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Q3) a) Solve the instance of Travelling sales person problem to find tour of minimum cost. [8]



b) What is an Algorithm? What are the characteristics of the algorithm? [8]

Q4) Write short note on (Solve any three) [18]

a) Difference between Priori and Posteriori analysis.

b) Randomized algorithms

c) Knapsack 0/1

d) Greedy Method

Q5) a) Explain breadth first search and depth first search with suitable example. [8]

b) Explain solution to knapsack problem using back-tracking. [8]

Q6) a) What is node cover decision problem? Show that clique decision problem is reducible to node cover decision problem. [8]

b) Explain non deterministic satisfiability and non deterministic clique problem. [8]

Q7) a) What is deterministic list ranking problem in PRAM? Explain with example. [8]

b) Explain prefix sum computation with the help of Mesh and Hypercube. [8]

Q8) Write short note on: [18]

a) Hamiltonian Cycle

b) Articulation Point

c) Butterfly network.

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Total No. of Pages : 2

Seat No.	

S.E. (CSE) (Semester - IV) (Revised) Examination, November - 2017

SOFTWARE ENGINEERING (Theory)

Sub. Code: 63535

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Q.3 and Q.6 are compulsory.**
2) **Solve any one from Q.1 and Q.2.**
3) **Solve any one from Q.4 and Q.5.**
4) **Figures to the right indicate full marks.**

Q1) a) Explain prototyping model in detail. **[6]**

b) What is SRS? State and briefly explain the desirable qualities of the SRS documents. **[7]**

Q2) a) What is a project management process? Briefly explain the three phases in it. **[7]**

b) What do you mean by the project planning process? State and briefly explain the activities in it. **[6]**

Q3) Write short note on (any 3) **[4 + 4 + 4]**

a) Scale and change

b) Team structure

c) Risk Management

d) SEI CMM.

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Q4) a) When do you say that a system is modular? Explain the concept of open-closed principle. **[6]**

b) Explain black box testing in detail. **[7]**

Q5) a) What is the objective of coding? Explain the concept of code walkthrough in code reviews. **[6]**

b) Explain the concept of software reliability? State the main reasons that make software reliability more difficult to measure than hardware reliability. **[7]**

Q6) Write short note on (any three) **[4 + 4 + 4]**

a) Verification.

b) Program Analysis Tools.

c) ISO 9000.

d) Agile software development.

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Total No. of Pages : 3

Seat No.	

S.E. (CSE) (Semester - III) (New Course)
Examination, November - 2017
DISCRETE MATHEMATICAL AND STRUCTURES
Sub. Code : 63525

Day and Date : Monday, 13-11-2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Q.3 and Q. 6 are Compulsory from Section I and Section II.**
2) **Attempt anyone questions from Q.1 and Q. 2.**
3) **Attempt anyone questions from Q.4 and. Q.5.**

SECTION - I

Q1) a) Define well formed formula State whether the following are wffs. **[4]**

i) $(A \rightarrow B) \vee (B \rightarrow C)$

ii) $(((\neg B)\, D) \rightarrow (P \rightarrow Q))$

b) Obtain PDNF of, $\neg P \vee Q$. **[4]**

c) Give the Power set of following **[5]**

A= {a, b, c}, B= {1, Φ }

Q2) a) Let X = { 1 ,2,3} and f,g,h and s be functions from X to X given by **[4]**

f = {<1,2>,<2,3>,<3,1>} g ={<1,2>,<2,1>,<3,3>}

h = {<1,1>,<2,2>,<3,1>} s = {<1,1>,<2,2>,<3,3>}

Find i) gof ii) fog iii) sog iv) fos

b) What is a monoid homomorphism and Explain with example? **[4]**

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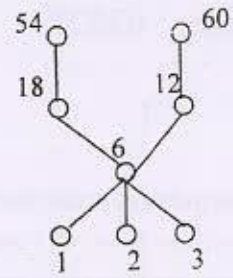
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c) Find lower bounds and upper bounds and GLB and LUB (if any) for the set [5]

i) {6, 12, 60}

ii) { 12,18,54,60}



Q3) Write a short note on (any 3) [12]

a) Partitioning and covering of set.

b) Functionally complete set of connectives.

c) Properties of equivalence relations.

d) Clock algebra.

SECTION - II

Q4) a) Define following w.r.t graph [6]

i) Path

ii) Node base

iii) Connected graph

b) Explain different methods of storage representation of graph. [6]

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Q5) a) Explain rule of product and rule of sum with example? **[6]**

b) Define following **[6]**

i) Lattice.

ii) Direct product.

iii) Distributive lattice.

Q6) a) When a certain defective die is tossed, the numbers from 1 to 6 will appear with following probabilities **[6]**

p (1) = 2/18 p (2) = 3/18 p(3) = 4/18

p (4) = 3/18 p (5) = 4/18 p(6) = 2/18

Find the probability that

i) An odd number is on top

ii) a prime number is on top

iii) A number less than 5 is on top

b) Write a short note on PERT. **[7]**

OR

Let G={ 1,2,3,4,5} and the operation addition module 6 is denoted by + 6 prepare composition table and show that set G is not a group. **[7]**



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Total No. of Pages : 2

Seat No.	

S.E. (Computer Science & Engg.) (Part - II) (Semester - IV) (Theory) (Old) Examination, November - 2017

ADVANCED MICROPROCESSORS

Sub. Code : 43617

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Attempt any 2 questions from Section I.**
2) **All questions compulsory in Section II.**
3) **Figures to the right indicate full marks.**
4) **Assume suitable data whenever necessary.**

SECTION - I

Q1) a) With the help of block diagram explain architecture of 8086 microprocessor. **[7]**

b) Explain Interrupt structure of 8086. **[6]**

Q2) a) Write an assembly language program for block transfer having length 05 numbers. Source address is 6000 H and destination address 8000 H. **[6]**

b) Discuss real addressing mode of 80286. **[6]**

Q3) Write short note on : **[4 + 4 + 4]**

a) Features of 80286.

b) Explain following assembler directives.

i) ASSUME

ii) ENDS

iii) OFFSET

iv) SEGMENT

c) Flag register of 8086.

SECTION - II

Q4) a) Explain Paging mechanism of 80386 with neat diagram. **[8]**

b) Draw block diagram of Pentium 4 micro architecture. **[5]**

Q5) Write short note on : (Any Two) **[2 × 6 = 12]**

a) Real addressing mode of 80386.

b) Features of P4 architecture.

c) Branch Prediction.

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Total No. of Pages : 2

Seat No.	

S.E. (Computer Science & Engg.) (Part-II) (Semester-III) (Revised) Examination, November - 2017

DATA STRUCTURES

Sub. Code : 63526

Day and Date : Wednesday, 15-11-2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary.**

Q1) a) With help of suitable algorithm, explain working of Enqueue and Dequeue operation of Simple Queue. **[7]**

OR

With the help of suitable example, explain following operations of Circular Queue.

i) Enqueue

ii) Dequeue

iii) Traverse

b) Explain following terms with help of suitable example **[6]**

i) Array

ii) Function

iii) Structure

Q2) a) Write a C program to implement Insertion Sort. **[4]**

b) What is Hashing? Explain Open and Closed hashing. **[4]**

c) Compare Linear Search and Binary Search. **[4]**

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Q3) a) Construct algorithm for following operations on a Doubly Linked List **[7]**

i) Create at End

ii) Delete at Start

iii) Traverse

b) Define Graph? Explain BFT and DFT Traversal Techniques. **[6]**

OR

Explain basic graph terminologies with help of suitable examples.

Q4) a) Write algorithm to delete a node at given location in a Singly Linked List. **[4]**

b) What is AVL Tree? Explain with help of suitable example, construction of AVL Tree. **[4]**

c) With help of suitable example, explain inorder, preorder and postorder traversal techniques. **[4]**

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Total No. of Pages :2

Seat No.	

S.E. (CSE) (Part - II) (Semester - III) (Revised) Examination, November - 2017

DATA COMMUNICATIONS

Sub. Code: 63527

Day and Date :Tuesday, 21 - 11 - 2017 **Total Marks : 50**

Time :9.30 a.m. to 11.30 a.m.

Instructions : 1) **Solve any TWO questions from each Section.**

2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Write a short note on four fundamental characteristics on which the effectiveness of a data communications system is depend. **[6]**

b) With neat diagram for physical layer discuss about the any five responsibilities of physical layer in OSI model. **[7]**

Q2) a) Explain Nyquist Bit Rate for noiseless channel.

Consider the noiseless channel with bandwidth of 3000 Hz transmitting a signal with two signal levels. What is the maximum bit rate? **[6]**

b) Explain about Manchester line coding scheme.

Draw diagram for 1010111110 using Manchester scheme. **[6]**

Q3) a) Write about any five advantages and any two disadvantages of optical fiber. **[7]**

b) Explain in brief about any TWO about following : **[6]**

i) Repeaters.

ii) Bridges.

iii) Switches.

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SECTION - II

Q4) a) Define Hamming distance and Explain Hamming code for C(7,4) in detail. [7]

b) Explain piggy backing concept in detail. [6]

Q5) a) Design the Selective Repeat Protocol for Noisy channels in detail. [7]

b) Explain IEEE standard in detail. [6]

Q6) a) Explain Slotted ALOHA Protocol in detail. [6]

b) Explain 802.6 standard (DQDB) and 802.2 logical link. [6]

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Total No. of Pages : 2

Seat No.	

S.E. (CSE) (Part - II) (Semester - III) Examination, November - 2017

MICROPROCESSORS

Sub. Code : 63528

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions : 1) **Attempt any two Questions from Q.No. 1, 2, 3 and 5, 6, 7.**
2) **Question No. 4 and 8 are compulsory.**

SECTION - I

Q1) a) Draw and explain architecture of 8085 Microprocessors. [5]

b) Write Concept of Real Mode memory addressing of microprocessors. [5]

Q2) a) Explain all Data addressing Mode of advanced microprocessors. [5]

b) Write and explain program of subtraction between two 8-bit no. [5]

Q3) a) Explain MOV Revisited concept of 16 bit instruction mode with example. [5]

b) Explain PUSH/POP instructions of advanced microprocessors. [5]

Q4) Write short note on (any one) : [5]

a) Access Right Byte.

b) Flag register for entire 80 × 86 and Pentium microprocessor family.

c) 80386-P4 descriptor.

SECTION - II

Q5) a) Explain all Addition and Subtraction instruction of advanced Microprocessors. [5]

b) Explain the 80386 Microprocessor. The memory system. [5]

Q6) a) Draw and explain the internal structure of the Pentium-Pro microprocessor. [5]

b) Explain Basic Interrupt Processing. [5]

Q7) a) Explain all BCD and ASCII instructions in details. [5]

b) Explain Memory Paging Mechanism. [5]

Q8) Write short note on (any one) : [5]

a) Hyper Threading Technology.

b) Special Pentium Register.

c) The Jump Group.

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Total No. of Pages : 2

Seat No.	

S.E. (CSE) (Part -II) (Semester - IV)
Examination, November - 2017
COMPUTER ORGANIZATION (Theory)
Sub. Code : 63533

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Solve all Questions**
2) **Q.No.1 and Q.No.4. is compulsory**
3) **Solve any one from Q.No.2,Q.No. 3 and one from Q.no.5,Q.No.6**
4) **Figures to right indicate full marks.**

SECTION - I

Q1) a) Write the IEEE 754 64 bit floating point number format. **[1]**

b) Write Non-restoring division algorithm for unsigned integers. **[6]**

c) Illustrate Booth multiplication algorithm for **[6]**

X=10110011 Y=11010101

Q2) a) Write a short note on1. Electronic Era 2. Mechanical Era. **[6]**

b) Write a short note on 1.RISC Computer 2.CISC Computer. **[6]**

Q3) a) Explain P-IV Processor. **[6]**

b) Explain overview of CPU Behavior. **[6]**

Q4) a) Explain Memory allocation. **[7]**

b) Explain Cache Organizations. **[6]**

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Q5) a) Design GCD processor using classical method. **[6]**

b) Draw and explain flowchart of the accumulator based CPU **[6]**

Q6) a) Design two's complement multiplier control unit using micro programmed approach **[6]**

b) Write a short note on

i) Parallelisms in microinstructions.

ii) Microoperation timing. **[6]**

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Total No. of Pages : 2

Seat No.	

S.E. (CSE) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

OPERATING SYSTEM - I (Theory)

Sub. Code : 63534

Day and Date : Monday, 6-11-2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Q. No.1 from and Q. No.4 are compulsory.**
2) **Solve anyone from Q. No.2 and 3 and anyone from Q. No.5 and 6.**
3) **Assume suitable data wherever necessary.**

SECTION - I

Q1) a) Discuss an abstract view of an Operating System. **[7]**

b) What are the functions of an Operating System? **[6]**

Q2) a) Discuss different synchronization and buffering techniques involved in IPC. **[6]**

b) Explain process creation in detail. **[6]**

Q3) a) Explain the use of hardware instructions to solve the critical section problem. **[6]**

b) Give the solution to the FIRST writers - readers problem. **[6]**

SECTION - II

Q4) a) Give an example where there is a cycle in the resource allocation graph but no deadlock. **[6]**

b) Why does deadlock recovery comes with a compromise / loss? **[7]**

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Q5) a) Why is safety algorithm used? What is a safe sequence? Can we have multiple safe sequences? Justify your answer. **[6]**

b) With the help of a diagram explain demand loading of a page. **[6]**

Q6) Write Short Notes on - (Any three) **[3 × 4]**

a) Deadlock Avoidance.

b) LRU Page Replacement.

c) File Operations.

d) Characteristics of I/O devices (Application I/O interface).

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Total No. of Pages : 3

Seat No.	

S.E.(CSE) (Semester - III) Examination, November - 2017

APPLIED MATHEMATICS

Sub. Code : 63524

Day and Date : Friday, 10 - 11 - 2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions : 1) Attempt any two questions from each section.
2) Use of non-programmable calculator is allowed.
3) Figures to the right indicate full marks.

SECTION - I

Q1) Attempt any two. **[12]**

a) Using following data find equation of regression to estimate total units sold if price of an item is known.

Price in thousands (X)	12.2	14.0	16.5	17.0	18.3	19.4	20.0
Total units sold (Y)	240	205	171	165	154	131	122

b) Find value of following integral using Simpson's $3/8^{th}$ rule $\int_0^{\pi/2} x^2 \cos x \, dx$.

c) Determine root of the equation correct up to four decimal places using Newton-Raphson Method $\sin x - 2e^x = 0$.

Q2) Attempt any two. **[12]**

a) If an engineer has to attend on an average 5 clients in day, Using Poisson probability distribution find the probability that

i) the engineer will be idle on a day.

ii) the engineer will attend at the most one clients.

b) The number of defective spare parts in a pack of ten parts follows binomial probability distribution with mean2. Find probability that a random pack contain at least three defective spare parts.

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c) Daily sale (in rupees) of certain electronic component follows normal distribution with average 5550 rupees and standard deviation is 250 rupees. What percent of time the sale of the component will be

i) more than 5240days?

ii) more than 5860?

Area under normal curve from 0 to 1.24 is 0.3925.

Q3) a) Fit Poisson probability distribution to the following data assuming mean one and find theoretical frequencies. **[6]**

Number of defects in garments	0	1	2	3	4	5
Number of samples	35	52	48	25	13	5

b) Fit second degree parabola to following data. **[7]**

x	1	2	3	4	5	6
y	2	6	12	20	30	42

SECTION - II

Q4) Following table gives time (in min.) required to four different persons to complete five different tasks. If one person can complete only one task then determine assignment schedule in order to minimize the total time of completion of tasks. **[12]**

		Task				
		A	B	C	D	E
Person	I	135	124	128	126	131
	II	134	132	135	124	132
	III	129	125	138	135	133
	IV	128	126	127	133	132

Q5) a) State main difference between characteristic function and membership function. **[3]**

b) Let $A(x)=\frac{0.3}{1}+\frac{0.9}{2}+\frac{0.7}{3}$ and $B(x)=\frac{0.2}{-1}+\frac{0.4}{0}+\frac{0.5}{1}$. Also if $f: X\times X\to X$ is defined for all $x_1, x_2 \in X$ such that $f(x_1,x_2)=x_1+x_2$ then using extension principle find f(A, B). **[5]**

c) Find $\bar{A}\cup\bar{B}$ using the fuzzy set defined by **[5]**

$$A(x)=\frac{x}{x+1},\ x\in\{0,1,2,3\} \text{ and } B(x)=\frac{1}{x+1},\ x\in\{0,1,2,3\}$$

Q6) Attempt any two. **[12]**

a) Find α-cut of A+B for the fuzzy set defined by

$$A(x)=\begin{cases}0 & \text{if } x\le -1, x>3\\ \frac{x+1}{2} & \text{if } -1<x\le 1\\ \frac{3-x}{2} & \text{if } 1<x\le 3\end{cases} \text{ and } B(x)=\begin{cases}0 & \text{if } x\le 1, x>5\\ \frac{x-1}{2} & \text{if } 1<x\le 3\\ \frac{5-x}{2} & \text{if } 3<x\le 5\end{cases}$$

b) If $A(x)=\frac{0.2}{x_1}+\frac{0.5}{x_2}+\frac{0.7}{x_3}+\frac{0.3}{x_4}$ and $B(x)=\frac{0.3}{x_1}+\frac{0.4}{x_2}+\frac{0.6}{x_3}+\frac{0.3}{x_4}$.

Find $A\cap B$ and $\overline{A\cap B}$. Also find heights of $A\cap B$ and $\overline{A\cap B}$.

c) Find fuzzy cardinality of $A(x)=\frac{1}{5}+\frac{0.5}{4}+\frac{0.6}{3}+\frac{0.7}{2}+\frac{0.2}{1}$.

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Total No. of Pages :3

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T.E. (Mechanical) (Part-III) (Semester - VI) (Revised) Examination, November - 2017

METROLOGY AND QUALITY CONTROL

Sub. Code :66839

Day and Date : Friday , 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume any data if necessary and state it clearly**

Q1) Solve any two of the following **[18]**

a) What is the limit gauges. Explain the 'Taylor's principle for design of 'limit gauges'

b) Explain the following terms with neat sketch.

i) Unilateral tolerance

ii) Bilateral tolerance

iii) Upper deviation

iv) Lower deviation

c) Calculate the limits of the following 25 H7 d8 designated fit, identify it and draw it graphically, the standard tolerance is given by

$i = 0.45D^{\frac{1}{3}} + 0.001D$

i) 25 lies between steps of 18-30mm

ii) Fundamental deviation of d shaft=$-16D^{0.44}$

iii) for grade IT7 tolerance = 16i and for IT8 tolerance=25i

iv) Fundamental deviation of H-hole=0

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Q2 Solve any two of the following [16]

a) Compare mechanical comparator with optical comparator with the help of neat sketches.

b) Explain the use of sine bar for measuring an angle with the help of neat sketch and state its limitations.

c) Explain construction, working and limitations of sigma comparator.

Q3) Solve any two of the following [16]

a) Define straightness and flatness. Briefly explain how straightness and flatness is measured and specified.

b) Explain principle and working of Tomlinson's surface meter with neat sketch.

c) Define surface texture, Lay and explain ten point average method for surface finish measurement.

Q4) Solve any two of the following [16]

a) Define major diameter, effective diameter and enumerate various errors in screw thread.

b) Derive an expression for effective diameter measurement by 2-Wire method for external threads.

c) Describe the gear tooth vernier caliper and explain its use for checking tooth thickness.

Q5) Solve any two of the following [16]

a) Differentiate between quality control and quality assurance.

b) What is cost of quality? Explain cost of failure, cost of appraisal and cost of prevention.

c) Discuss the factors that control, quality of design and quality of conformance.

Q6) Solve any two of the following [18]

a) State the advantages, applications of control charts and sketch different patterns of control charts

b) Discuss following acceptance sampling terms

i) Average out going quality

ii) Average out going quality level

iii) Accepted quality level

c) A machine is working to a specification 80.75± 0.1mm a study of 32 consecutive pieces shows the following measurements. Construct the $\overline{X}$ and R chart and calculate process capability (For sample size of 8 take A_2 =0.37, D_4 =1.86, D_3 =0.14,d_2=2.847)

1st day	2nd day	3rd day	4th day
80.74	80.76	80.77	80.73
80.73	80.76	80.72	80.75
80.72	80.75	80.77	80.81
80.74	80.73	80.71	80.77
80.74	80.75	80.73	80.74
80.76	80.75	80.74	80.74
80.78	80.77	80.76	80.80
80.78	80.77	80.80	80.81

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Total No. of Pages :3

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T.E. (Mechanical) (Semester - VI) (Revised) Examination, November - 2017
INDUSTRIAL FLUID POWER
Sub. Code: 66838

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Draw neat diagrams/sketches wherever necessary.**
3) **Figures to right indicates full marks.**

Q1) Solve any two:

a) Explain in brief the basic requirements of a Pneumatic system. **[7]**

b) Explain the important properties of hydraulic fluids. **[7]**

c) Draw the symbols and explain the function of the following elements:**[7]**

i) F.R.L unit

ii) Four way, three position-open center solenoid operated D.C valve.

iii) Weight loaded Accumulator.

iv) time delay valve.

Q2) Solve any three:

a) Explain the working of swash plate type axial piston pump with neat sketch. **[6]**

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b) Explain the function of cushioning in cylinders with neat sketch. **[6]**

c) Explain fluid conditioning and also explain with neat symbols types of reservoirs. **[6]**

d) Classify intensifiers and explain any one of them. **[6]**

Q3) Solve any three:

a) Draw a schematic of 4/2 pilot operated DCV and briefly explain its function. **[6]**

b) Draw schematically a sequence valve and explain its function. **[6]**

c) Explain the working of pressure compensated flow control valve with neat sketch. **[6]**

d) Explain use of any two center positions of D.C valves in hydraulic circuits. **[6]**

Q4) Solve any three:

a) Explain with neat sketch working of screw compressor used in pneumatic systems. **[6]**

b) Explain schematically different piping layouts in Pneumatic systems. **[6]**

c) Explain with the help of neat sketch the construction and working of air motor. **[6]**

d) Explain the working of 5/2 Direction control valve with a neat sketch. **[6]**

Q5) Solve any Three.

a) A vehicle is raised and held for about five hours and is to be descended slowly without any jerks, suggest and draw a suitable hydraulic circuit for the same. **[6]**

b) Explain the speed control circuit for an air motor. **[6]**

c) With the aid of circuit diagram explain the use of shuttle valve in pneumatic circuit. **[6]**

d) Explain with circuit diagram travel dependent sequencing mechanism in hydraulic system. **[6]**

Q6) Write short notes on: (Solve any two)

a) Pneumatic servo system. **[7]**

b) Safety precautions in handling hydraulic systems. **[7]**

c) Fluidics. **[7]**

What will be your decision under the following approaches

i) Optimistic Criterion

ii) Pessimistic Criterion

iii) Leplace Criterion

iv) Hurwicz Criterion ($\alpha = 0.7$)

c) Draw the project network for the following activities and determine critical path and project duration.

Activity	Preceding activity	Duration (days)
A	-	8
B	A	12
C	A	8
D	B,C	7
E	A	8
F	D,E	17
G	C	21
H	F,G	9
I	H	11

d) Determine optimal sequence, elapsed time and idle time of the following six jobs on the machine M1,M2 and M3 used in the same sequence to process these jobs.

	Jobs					
Machines	J1	J2	J3	J4	J5	J6
M1	15	14	16	13	10	8
M2	8	10	7	15	11	9
M2	8	10	7	15	11	9

Total No. of Pages :4

Seat No.	

T.E. (Mechanical) (Part - II) (Semester - VI) (Revised) Examination, November - 2017

INDUSTRIAL MANAGEMENT & OPERATIONS RESEARCH

Sub. Code: 66837

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**
4) **All questions are to be solved on one answer book only.**

Q1) Attempt any four (5 Marks Each) **[20]**

a) State the need of planning in manufacturing a component from vendors.

b) Explain in brief Process of Organizing.

c) Is there any difference between Authority & Responsibility. Justify your answer with suitable example.

d) Discuss the implications of the Herzberg's theory as a strategy for motivating employees.

e) Whether controlling is an essential function of management? If yes then explain the steps involved in controlling process?

Q2) Attempt any two (6 Marks Each) **[12]**

a) Which factors related to environmental influence sugar manufacturing industry?

b) What are the problems of SSI involved in manufacturing components of automobile sector?

c) How to prevent an accident in a gas welding section of fabrication unit? Does the purchasing of safety equipments increases cost of operation?

Q3) Write short notes on any three (6 Marks Each) **[18]**

a) Types of markets

b) 4 P's of market

c) Functions of Purchase department

d) Purchase policy and procedure

e) Cost estimation

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Q4) Attempt any three (6 Marks Each) **[18]**

a) Define Operations Research. Briefly explain the characteristics of Operations Research.

b) Use graphical method to solve the following,

Maximize $Z = 5X_1 + 4X_2$

Subjected to constraints,

$5X_1 + 2X_2 \leq 40$,

$3X_1 + 3X_2 \leq 30$

$3X_1 + 5X_2 \leq 45$

$X_1, X_2 \geq 0$.

c) A company manufactures three jobs namely X, Y and Z. Each of the product require processing on three machines, Turning, Milling and Drilling. Product X requires 5 hours of turning, 2 hours of milling and 20 minutes of drilling. Product Y requires 3 hours of turning, 5 hours of milling and 30 minutes of drilling, and Product Z requires 1 hour of turning, 2 hours of milling and 30 minutes of drilling. In the coming planning period, 270 hours of turning, 220 hours of milling and 50 hours of drilling are available. The profit contribution of X,Y and Z are Rs. 500, Rs.750 and Rs. 1000 per unit respectively. Formulate LPP to maximize the profit. Suggest suitable method for solution of LPP.

d) Use simplex to solve the following problem and obtain initial and second feasible solution (two simplex tables only)

Minimise $Z = 5X_1 + 3X_2 + 2X_3$

subjected to constraints,

$3X_1 + 2X_2 + 2X_3 \leq 120$,

$2X_1 + 3X_2 + 3X_3 \leq 240$

$X_1, X_2, X_3 \geq 0$.

Q5) Attempt any two (7 Marks Each) **[14]**

a) How does the problem of degeneracy arise in a transportation problem? Explain how one can overcome it?

b) The unit transportation cost along with capacity and requirements from a supplier to a restaurant is as given below

Supplier	Restaurant				Capacity
	1	2	3	4	
A	25	40	75	20	4000
B	50	40	65	25	3000
C	25	50	70	40	3000
Requirements	1600	2400	3000	2000	

Obtain initial basic feasible solution by least cost method & VAM

c) A company has four workers and five jobs. Expected profit in Rs. for each job when assigned to different workers is given in the matrix below. Solve the assignment problem & estimate the total profit

Worker	Jobs				
	A	B	C	D	E
1	60	76	48	99	80
2	69	82	59	71	57
3	85	90	109	69	79
4	46	62	85	75	78

Q6) Write short notes on any three (6 Marks Each) **[18]**

a) Explain the various quantitative methods that are useful for decision making under risk.

b) The following matrix gives the payoff (in Rs.) of different strategies against events.

Strategies	Events			
	E_1	E_2	E_3	E_4
S_1	4,000	100	6,000	18,000
S_2	20,000	5,000	400	0
S_3	20,000	15,000	2,000	1,000

Total No. of Pages : 3

Seat No.

T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MANUFACTURING ENGINEERING

Sub. Code : 66245

Day and Date : Wednesday, 22 - 11 - 2017 Total Marks : 100

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume if necessary suitable data and state them clearly.
4) Use of non-programmable calculators is permissible.

SECTION - I

Q1) Solve any two:

a) Explain with neat sketch the types of milling cutters. [8]

b) Derive an expression for Shear strain. [8]

c) In an Orthogonal cutting of the material, Cutting force (F_H) =138Kg, Feed force (F_v) = 68Kg, Rake angle (α) =7°, Chip thickness ratio (r) = 0.4. Determine

i) Coefficient of friction of chip

ii) Shear force (Fs) and normal to shear force (Fn). [8]

Q2) Solve the following questions.

a) Define machinability. Explain the factors affecting machinability. How the machinability index is defined? [8]

OR

a) Explin concept of wear & types of wear with sketch. [8]

b) Determine [8]

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i) Taylor's Tool life equation

ii) Cutting speed for 6 minutes of tool life when tool life of 70 minutes is obtained at a speed of 25m/min and 15 minutes at 40m/min.

The component shown in fig. is to be processed on a single spindle automat. Study the component and prepare: **[18]**

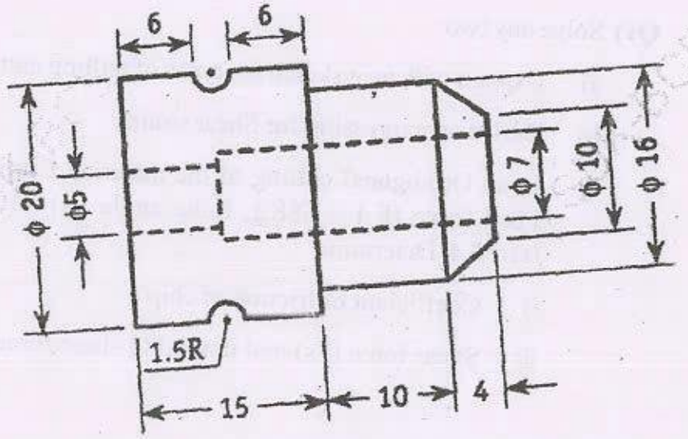
a) Detailed process sheet

b) Tool Layout

c) Cam profile for drilling operation-of ϕ5 mm hole through

d) Calculate Production rate per hour

Material –ϕ 20 Bronze bar All dimensions are in mm.



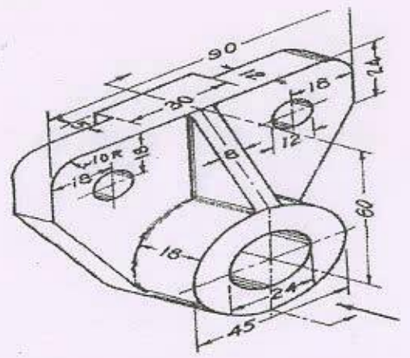
SECTION - II

Q4) Design & draw neat dimensional drawing in three views with one sectional view of jig for drilling two holes ϕ12 in the given bracket as shown in figure. **[26]**

OR

Design & draw neat dimensional drawing in three views with one sectional view of Milling fixture for creating plane surface of ϕ 24mm of the given bracket as shown in figure.

Also Justify the selection of location, clamping & guiding elements.



) Attempt any two.

a) Explain with neat sketch the Compound die. **[6]**

b) Explain types of Stock stop. **[6]**

c) Explain the importance of following in Press working **[6]**

i) Strippers

ii) Clearanace

[12]

6) Write short notes any three.

a) Construction & working of CNC.

b) Automatic Tool Changer.

c) CNC axes and drives.

d) Modular Tooling System.

Q6) a) Explain the step by step procedure for selection of V- belt from Manufacturer's Catalogue. [6]

b) It is required to select flat belt drive for a fan running at 360 rpm which is driven by a 10kW 1440 rpm motor. The belt drive is open type and space is available for a center distance of 2 m approximately. The belt should operate at velocity between 17.80 m/s to 22.90 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0118 kW. The load correction factor can be taken as 1.2. Suggest preferred pulley diameters for the motor and fan pulleys and give complete specifications of belting. Refer the tables given below. [10]

Arc of Contact Factor (F_d)

α_s(Deg)	130	140	150	160	170	180	190	200
F_d	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard Widths of these belts in mm

3–Ply	25	40	50	63	76					
4–Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

For flat pulleys: Series of preferred values of pitch diameters (in mm) are as follows.

Pitch diameter (mm):	125	132	140	150	160	170	180	0	
200	212	224	236	250	265	280	300	315	355	375
400	425	450	475	500	530	560	600	630	670	710
750	800	900	1000							

Total No. of Pages :4

Seat No.

T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MACHINE DESIGN - I

Sub. Code: 66244

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumption wherever required and state them clearly.**
4) **Use of non-programmable calculator is permitted.**
5) **Draw neat diagrams wherever necessary.**

Q1) Solve any Three: [18]

a) Summarize material selection procedure adopted for designing a machine element.

b) Name different theories of failure.Illustrate the use of theory of failure for brittle material.

c) Explain the design procedure for a turn-buckle with the help of neat sketch.

d) Write a note on design of bolted joints with load perpendicular to the axis of bolt.

Q2) a) A bell crank lever to raise a vertical load is shown in fig 2a. The vertical load to be lifted is 4500N. The lever consists of forged steel material and a pin at the fulcrum F. Assume following data for the lever material. Safe stress in tension = 75 MPa; safe stress in shear=60MPa; safe bearing pressure on pins=10N/mm². Determine the pin diameter at end P, dimensions at F and cross section Y-Y (near to fulcrum) [8]

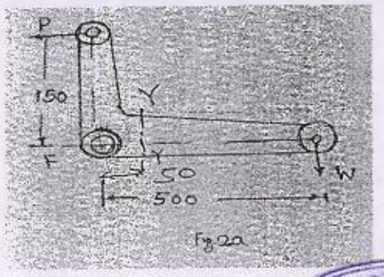
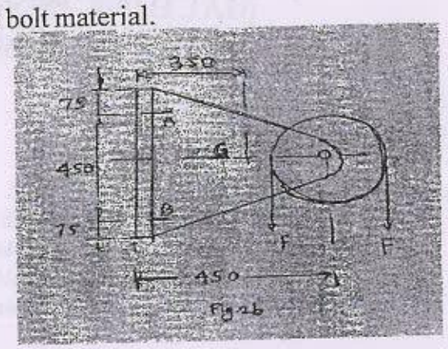


Fig 2a

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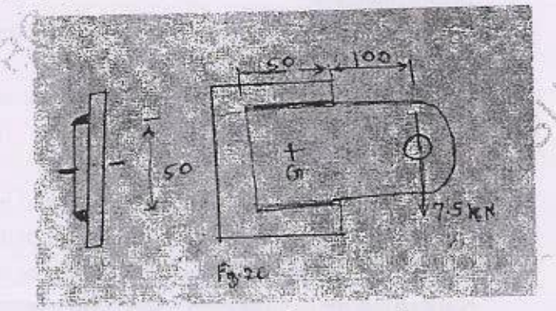
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b) Figure 2b shows a pulley bracket, which is supported by 4 bolts, two at A and two at B. The weight of pulley and bracket, W is 1850N, and the load, F on the rope is 20kN.
Determine the size of the bolts, using an allowable shear stress of 40 MPa for the bolt material. **[8]**



OR

c) A welded connection as shown in figure 2c is subjected to the eccentric force of 7.5 kN. Determine the size of welds if the permissible shear stress for the weld is 90N/mm². Assume static conditions. **[8]**



Q3) a) Discuss the design procedure for square key. **[6]**

b) A splined connection with the following particulars is used for a gear and shaft assembly in a gear box. The power to be transmitted is 20kW at 240 r.p.m. The bearing pressure on the splines is limited to 6.5.MPa during sliding. The coefficient of friction is 0.1 **[10]**
Major diameter = 60mm
Minor diameter = 54 mm
Number of splines = 10
Determine (i) The length of gear hub
ii) The force required to shift the gear.

OR

c) Design a cast iron protective type flange coupling to transmit 15 kW at 900 r.p.m. from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used:
Shear stress for shaft, bolt and key material =40MPa
Crushing stress for bolt and key = 80 MPa
Shear stress for cast iron = 8 Mpa
Draw a neat sketch of the coupling. **[10]**

Q4) a) What are the various types of springs used in practice? Explain one application of each. **[6]**

b) Design a close coiled helical compression spring for a service load ranging from 2245N to 2745N. The axial deflection of the spring for this load range is 6mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity is 84kN/mm². Assume squared and ground ends for coil. Neglect the effect of stress concentration. Draw fully dimensioned sketch of the spring.
Std. wire gauge (SWG) number and corresponding diameter of spring wire is given in the following table. **[10]**

SWG	6/0	5/0	4/0	3/0	2/0
Diam.mm	11.785	10.973	10.160	9.490	8.839

Q5) a) Derive an expression for maximum efficiency for square threaded screw. **[6]**

OR

What is recalculating ball screw? Explain with neat sketch.

b) The power transmission screw of a screw press is required to transmit maximum load of 100 kN and rotates at 60 RPM. The trapezoidal threads are to be used as under:

Nominal Dia. mm	40	50	60	70
Core Dia. mm	32.50	41.50	50.50	59.50
Mean Dia. mm	36.50	46.00	55.50	65.00
Core Area mm²	830	1353	2003	2781
Pitch mm	7	8	9	10

The screw thread friction coefficient is 0.12. The torque required for collar friction and journal bearing is about 10% of the torque to drive the load considering screw friction. Determine screw dimensions and its efficiency. Also determine the motor power required to drive the screw. The maximum permissible compressive stress in the screw is 100 MPa. **[12]**

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Seat No.	

T.E. (Mechanical) (Part-III) (Semester-V) (Revised)
Examination, November - 2017
HEAT AND MASS TRANSFER
Sub. Code : 66243

Day and Date : Tuesday, 14-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume Suitable Data wherever necessary and state it Clearly.**
4) **Use of scientific non programmable calculator is permitted.**

Q1) Solve any three:

a) Define critical radius of insulation. Also derive the equation for critical radius of insulation for hollow sphere. **[6]**

b) Explain the different modes of mass transfer. Explain with suitable examples. **[6]**

c) A 0.8m high and 1.5m wide double pane window consist of two 4mm thick layer of glass (k = 0.78 W/mK) separated by 10mm wide stagnant air space (k = 0.0626 W/mK). Determine the rate of heat transfer through this window when room is maintained at 20°C and outside air is at -10°C. Take convective heat transfer coefficient as 10 and 40 W/m²K. **[6]**

d) An aluminum pipe carries steam at 110°C. The pipe (k = 185 W/mK) has an inner diameter of 10cm and outer diameter of 12cm. The pipe is located in a room where the ambient air temperature is 30°C and convective heat transfer coefficient is 15 W/m²K. Determine heat transfer rate per unit length of pipe. Neglect convective heat transfer on steam side. **[6]**

Q2) Solve any two:

a) Derive expression for temperature distribution of a solid cylinder generating heat at the rate of q unit per unit volume. **[8]**

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b) Derive expression of temperature distribution for a solid body by using lumped heat capacity approach. **[8]**

c) A solid copper sphere of 10cm diameter (ρ = 8954 kg/m^3, C_p = 383 J/kgK, k = 386 W/mK). Initially at uniform temperature 250°C, it suddenly immersed in a fluid which is maintained at uniform temperature of 50°C. The heat transfer coefficient between sphere and fluid is 200 W/m^{2}K. Determine the temperature of copper sphere at 5 minutes after immersion. **[8]**

Q3) Solve any two:

a) Derive an expression for temperature distribution along the length of a pin fin with insulated tip. **[8]**

b) A 1m long, 5cm diameter cylinder placed in an atmosphere of 40°C is provided with 12 fins (k = 75 W/mK), 0.75mm thick, The fins protrudes 2.5cm from the cylinder surface. The heat transfer coefficient is 23.3 W/m^{2}K. Calculate the rate of heat transfer if the surface temperature of cylinder is 150°C. **[8]**

c) Determine thermal conductivity of long solid 2cm diameter rod, 1 end of the rod is inserted in a furnace while remaining portion is projected out in air at 30°C. After steady state has been reached, the temperature at two points on the rod which are 10cm apart are measured and found to be 120°C and 90°C respectively. If heat transfer coefficient is 20 W/m^{2}K. What will be thermal conductivity of the rod? **[8]**

Q4) Solve any two of the following:

a) With the help of dimensional analysis, analyze natural convection heat transfer problem. **[8]**

b) A vertical cylinder 1.5m high and 180mm in diameter is maintained at 100°C in an atmosphere environment of 20°C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean film temperature as, ρ= 1.06 kg/m^3, γ= 18.97×10^{-6}m^2/s, C_p=1.004 kJ/kg°C and k=0.0285 w/m°C, Pr = 0.708. **[8]**

Use correlation; $Nu_L = 0.10\ (Gr.Pr)^{1/3}$.

c) Air at a temperature of 20°C flows through a rectangular duct with a velocity of 10m/s. The duct is 30cm×20cm in size and air leaves at 34°C. Find the heat gain by air when it is passed through 10m long duct. The properties of air at 27°C are ρ=1.1774 kg/m^3, γ= 15.68 10^{-6}m^2/s, C_p=1057 J/kgK and k=0.03003 W/mK, Pr = 0.708. **[8]**

Use correlation ; $Nu = 0.023\ (Re)^{0.8}\ pr^{0.4}$.

Q5) Solve any two of the following:

a) Write a short notes on; **[8]**

i) Shape factor and its properties

ii) Radiation shield

b) Write plank's law and derive Stefan Boltzman law from Plank's law. **[8]**

c) The effective temperature of a body having an area of 0.12m^2 is 527°C. **[8]**

Calculate;

i) The total rate of energy emission

ii) The intensity of normal radiation

iii) The wavelength of maximum monochromatic emissive power

Q6) a) Draw the temperature distribution curve for following heat exchangers (any 3) **[6]**

i) Counter flow heat Exchanger

ii) Evaporator

iii) Parallel flow heat Exchanger

iv) Condenser

b) What are the design considerations of heat exchangers? **[6]**

c) The flow rates of hot and cold water streams running through a parallel flow heat exchanger are 0.2kg/s and 0.5kg/s respectively. The inlet temperatures of hot and cold sides are 75°C and 20°C respectively. The exit temperature of hot water is 45°C. If overall heat transfer coefficient is 325 W/m^{20}C, calculated the area of heat exchanger. Assume C_p of water 4.187 kJ/kgK. **[6]**

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b) The crank and the connecting rod of a 4 - cylinder in-line engine running at 1800 r.p.m. are 60 mm and 240 mm each respectively and the cylinders are spaced 150 mm apart. If the cylinders are numbered 1 to 4 in sequence from one end, the cranks appear at intervals of 90° in an end view in the order 1 - 4 - 2 - 3. The reciprocating mass corresponding to each cylinder is 1.5 kg. Determine:

i) Unbalanced primary and secondary forces, if any, and

ii) Unbalanced primary and secondary couples with reference to central plane of the engine. **[12]**

Q6) a) Derive expression for energy stored in a flywheel. **[6]**

b) A single cylinder double acting steam engine develops 150 kW at a mean speed of 80 rpm.The coefficient of fluctuation of energy is 0.1 and the fluctuation of speed is ± 2% of mean speed. If the mean diameter of the flywheel rim is 2 metre and the hub and spokes provide 5 % of the rotational inertia of the flywheel, find the mass and cross-sectional area of the flywheel rim. Assume the density of the flywheel material as 7200 kg/m^3. **[10]**

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Total No. of Pages :4

T.E. (Mechanical Engineering) (Part - III) (Semester - V) (Revised) Examination, November - 2017
THEORY OF MACHINES - II
Sub. Code: 66242

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume if necessary suitable data and state clearly.**
5) **Use of Non programmable calculator is permitted.**

Q1) a) Give the classification of Toothed Gearing and define the following terms.

i) Addendum.

ii) Module. **[8]**

OR

Derive the expression for the velocity of sliding between pair of involute teeth and define the terms.

i) PitchCircle.

ii) Diametral Pitch.

b) A pair of Spur gears with involute teeth is to give a gear ratio of 4 : 1. The arc of approach is not to less than the circular pitch and smaller wheel is the driver. The angle of pressure is 14.5°. Find

i) the least number of teeth that can be used on each wheel and

ii) the addendum of the wheel in terms of the circular pitch. **[10]**

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2) a) What are the various types of the torques in an epicyclic gear train. **[6]**

OR

Explain the concept of equivalent mass and moment of inertia applied for gear trains.

b) Fig. 2 b shows an epicyclic gear train with compound planets 'B - C', 'B' has 15 teeth and meshes with an annulus 'A' which has 60 teeth. 'C' has 20 teeth and meshes with the sunwheel 'D' which is fixed. The annulus is keyed to the propeller shaft 'Y' which rotates at 740 rad/s. The spider which carries the pins upon which the planets revolve is driven directly from main gear box by shaft 'X', this shaft being relatively free to rotate with respect to wheel 'D'. Find the speed of shaft 'X', when all the teeth have same module. When engine develops the 130 kW, what is the holding torque on the wheel 'D'? Assume 100 percent efficiency throughout. **[10]**

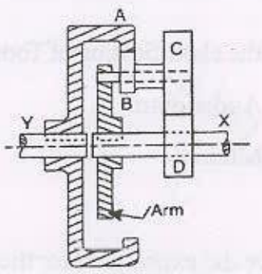


Fig. 2 b.

3) a) Condition for stability of two wheel vehicle moving in a curved path. **[6]**

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 rpm. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic couple in the following conditions.

i) The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.

ii) The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.

iii) The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern. **[10]**

4) a) Derive the equation for inertia torque analytically considering the effect of inertia of the connecting rod. **[6]**

OR

Derive an expression for velocity and acceleration of the slider of slider crank mechanism.

b) In a vertical double acting steam engine, the connecting rod is 4.5 times the crank. The weight of the reciprocating parts is 120 kg and the stroke of the piston is 440 mm. The engine runs at 250 rpm. If the net load on the piston due to steam pressure is 25 KN when the crank has turned through an angle of 120° from the top dead centre, determine the

i) thrust in the connecting rod.

ii) pressure on the slide bars.

iii) tangential force on the crank pin.

iv) thrust on the bearings.

v) turning moment on the crank shaft. **[10]**

5) a) Explain balancing of single rotating mass by two masses rotating in different planes. **[6]**

OR

Explain direct and reverse crank method for balancing of radial engine.

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Q4) a) Sketch root locus plot for $G(S)\,H(S) = \dfrac{K}{S(S^2+6.S+12)}$. [12]

b) A unity feedback control system is having an open loop transfer function $G(S) = \dfrac{K(S+13)}{S(S+3)(S+7)}$. Determine the range of values of K for the system to be stable. [6]

Q5) a) Sketch the Bode plot for the transfer function $G(S) = \dfrac{1000}{S(1+0.1.S)(1+0.001.S)}$. Determine gain margin and phase margin. [10]

b) Calculate break in point and angle of departure for the control system, given by characteristic equation $S^2 + 2S + 3 + K(S+2) = 0$. [6]

Q6) a) The motion of a numerically controlled machine tool is described by the differential equation $\ddot{y} + 7.\dot{y} + 10.y = f(t)$. Determine computer diagram and state space representation using parallel method. [8]

b) The motion of robot arm controlled by an electric motor is given by the differential equation $\ddot{y} + 6.\dot{y} + 9.y = f(t)$. Use series programming to determine computer diagram. [8]

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Total No. of Pages : 4

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T.E. (Mechanical) (Semester - V) Examination, November - 2017

CONTROL ENGINEERING

Sub. Code : 66241

Day and Date : Thursday, 09 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right Indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

Q1) a) For the mechanical system shown in Fig. 1 a, prepare grounded chair representation and construct electrical circuit using force current analog. [6]

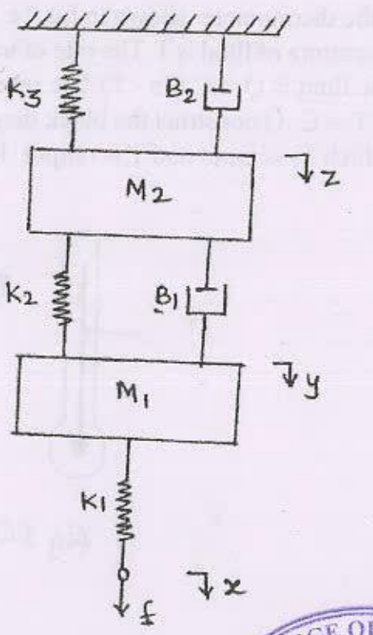


fig 1 a

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b) For the fluid system shown in Fig. 1b, determine equation of P1 in terms of P2 and P. [6]

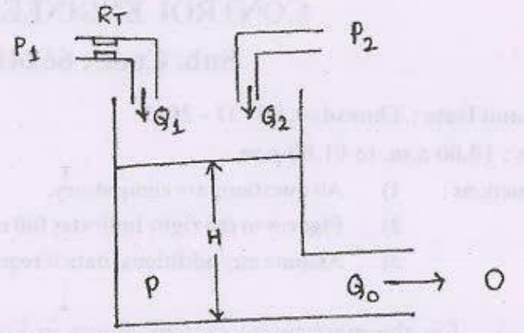


fig 1 b

c) For the thermometer shown in fig. 1c, the ambient temperature is Ts and temperature of fluid is T. The rate of heat flow from surrounding medium to the fluid is $Q = C_1(Ts - T)$ The rate of change of temperature of fluid is $D.T. = C_2.Q$ construct the block diagram representation for the system in which Ts is input and T is output. Determine time constant. [6]

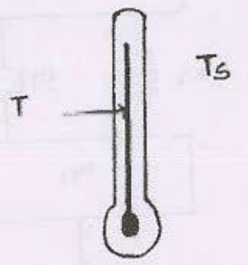


fig 1C

22) a) Determine linear approximation for the equation $Z = \sin X . \cos Y$ for $Xi = 60°$ and $Yi = 30°$, What is approximate value of Z when $X = 63°$ and $Y = 28°$. [8]

b) Reduce the block diagram shown in fig. 2b and obtain transfer function. [8]

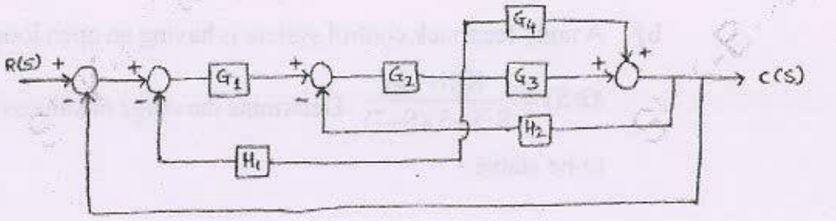


fig 2 b

23) a) A hydraulic control system is shown in fig. 3a. The forcing function is $r(t) = u(t)$ and all initial conditions are zero. Determine the response c(t) of system. [8]

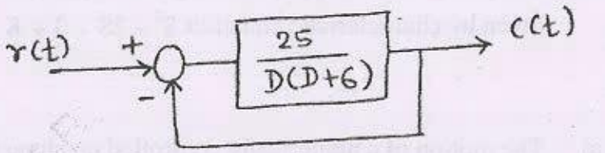


fig. 3 a

b) For the control system shown in fig. 3b, determine K_1, K_2 and a such that the system will have a steady state gain of 1, a natural frequency of 2 and damping ratio of 0.5. [8]

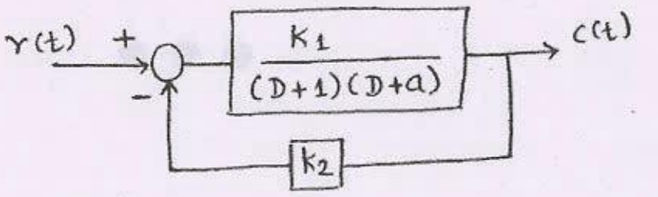


fig. 3 b

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Seat No.	

T.E. (Mechanical Engg.) (Part - III) (Semester-VI) Examination, November - 2017

MACHINE DESIGN - II

Sub. Code : 66840

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat sketches whenever necessary.**
3) **Figures to the right indicate full marks.**
4) **Make suitable assumptions if necessary and state it clearly.**

SECTION-I

Q1) a) Define stress concentration. What are causes and remedies over stress concentration? **[8]**

OR

a) Explain the following terms in relation with design of component subjected to fluctuating loads:
   i) Endurance limit
   ii) Surface finish factor
   iii) Size factor
   iv) Notch sensitivity

b) A work cycle of a mechanical component subjected to completely reversed bending stresses consist of the following three elements: **[8]**
   i) $\pm$ 350 N/mm^2 for 85% of time
   ii) $\pm$ 400 N/mm^2 for 12% of time
   iii) $\pm$ 500 N/mm^2 for 3% of time

   The material for the component is 50C4 (S_{ut} = 660 N/mm^2) and the corrected endurance limit of the component is 280 N/mm^2. Determine the life of the component.

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Q2) a) Explain the following terms in connection with roller bearing, **[8]**

i) Static load capacity

ii) Dynamic load capacity

iii) Equivalent load capacity

iv) Load - life relationship

OR

a) Differentiate between static and dynamic capacity of the ball bearing. What is their significance in the selection of the bearings?

b) A deep-groove ball bearing having bore diameter of 60 mm and rotating at 1440 r.p.m. is subjected to radial force of 2500N and an axial force of 1200 N. The radial and thrust factors are 0.56 and 2.0 respectively. The load factor is 1.2. The expected rating life is 25,000 hrs. Calculate the required dynamic load capacity and select the bearing from manufacturer's catalogue given below in table no. 1. **[8]**

Table no.1

Principal Dimensions				Basic Capacity	
Bearing No.	Bore Dia 'd' mm	Outside Dia 'D'mm	Width 'B' mm	Static 'Co' kN	Dynamic 'C' kN
6012	60	95	18	23.20	29.60
6212	60	110	22	32.50	47.50
6312	60	130	31	52.00	81.90
6412	60	150	35	69.50	108.00

Q3) a) Explain the following terms in relation to sliding contact bearings, **[8]**

i) Length to diameter ratio

ii) Unit bearing pressure

iii) Radial Clearance

iv) Minimum film thickness

OR

a) With neat sketches, describe construction and working principles of hydrodynamic bearings.

b) The following data is given for a 360° hydrodynamic bearing. **[10]**

Radial load = 3.2kN

Journal speed = 1490 rpm

Journal diameter = 50 mm

Bearing length = 50 mm

Radial clearance =0.05 mm

Viscosity of lubricant = 25 cp

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate

i) Coefficient of friction

ii) Power lost in friction

iii) Minimum oil film thickness

iv) Flow requirement in litres/min

v) Temperature rise

Refer following data table:

l/d	ε	h_0/C	S	ϕ	(r/C)f	$Q/(rCn_sl)$
1	0.1	0.6	0.264	63.10	5.79	3.99
	0.6	0.4	0.121	50.58	3.22	4.33
	0.8	0.2	0.0446	36.24	1.70	4.62
	0.9	0.1	0.0188	26.45	1.05	4.74
	0.97	0.03	0.0047	15.47	0.514	4.82

SECTION - II

Q4) a) Explain different types of gear tooth failure. **[8]**

OR

a) Explain the force analysis in the design of spur gears.

b) It is required to design a pair of spur gears with 20° full-depth involute teeth consisting of a 20-teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW, 1450 rpm electric motor. The starting torque of the motor can be taken as 150% of the rated torque. The material of the pinion is plain carbon steel Fe410 (S_{ut} = 410 N/mm^2), while the gear is made of grey cast iron FG 200 (S_{ut} = 200 n/mm^2). The factor of safety is 1.5. Design the gears based on the Lewis equation and using velocity factor to account for the dynamic load. Lewis form factors for 20 and 50 teeth are 0.32 and 0.408 respectively. Assume pitch line velocity as 5 m/s. Recommended series of module: 7 or 9. **[8]**

Q5) a) Derive expression for wear strength of helical gears. **[8]**

OR

a) Explain with neat sketch the concept of virtual number of teeth and its significance in the design of helical gear.

b) A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and the normal pressure angle is 20°. The normal module is 3mm. Calculate **[10]**

i) The transverse module
ii) The transverse pressure angle
iii) The axial pitch
iv) The pitch circle diameters of the pinion and the gear
v) The centre distance and
vi) The addendum and dedendum circle diameter of the pinion

Q6) a) Explain with neat sketch the force analysis of bevel gear. **[8]**

OR

a) Explain the strength rating of worm gearing.

b) A pair of worm gears is designated as 1/30/10/8 Calculate **[8]**

i) The centre distance
ii) The speed reduction
iii) The dimensions of the worm and
iv) The dimensions of the worm wheel

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T.E. (Mechanical) (Part - III) (Semester - VI) (New) (Revised) Examination, November - 2017

INTERNAL COMBUSTION ENGINES

Sub. Code: 66841

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt all the questions.**

2) **Make suitable assumptions if necessary and clearly mention them.**

3) **Figure to right indicate full marks.**

Q1) a) Define the following terms **[8]**

i) Clearance volume.

ii) Swept volume.

iii) Thermal efficiency.

iv) Air standard efficiency.

OR

b) Classify IC Engine and explain each type with examples. **[8]**

c) Explain with neat sketch port timing diagram for two stroke petrol engine. **[8]**

Q2) a) A four cylinder, four stroke square engine running at 40 rev/sec has a carburetor venturi with a 3 cm throat. Assuming the bore to be 10 cm, volumetric efficiency of 75%, the density of air to be 1.15 kg/m^3 and coefficient of air flow to be 0.75. Calculate, **[9]**

i) Engine volume sucked per second and mass flow rate.

ii) Suction pressure at throat.

b) Explain the following terms. **[9]**

i) Air fuel ratio and its types.

ii) Air fuel requirements for SI engine.

iii) Petrol injection in SI engine.

OR

c) Explain the injection nozzles used in CI engine and its types. **[9]**

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Q3) a) Write types of combustion chamber for SI engine and explain requirements of Combustion chamber. **[8]**

OR

b) Explain the factors influenced of engine variable on flame speed. **[8]**

c) Explain the effect of various engine variables on detonation. **[8]**

Q4) a) What modification is required, if the existing engine is to be supercharged? What are various methods of turbo charging? **[8]**

b) Explain with figure abnormal combustion in CI engine. Discuss for the control of knocking for CI engine. **[8]**

Q5) a) Discuss the various pollution norms and devices used for the control of engine emissions. **[8]**

b) What do you mean by induction swirl in combustion chamber of C I Engines? Discuss the advantages and disadvantages of the induction swirl. **[8]**

OR

b) What are the different methods to measure frictional power of ic engines. Explain Morse test. **[8]**

Q6) a) List the advanatges and disadvantages of supercharging of diesel engine. **[7]**

OR

a) Describe the sources for the production of Biodiesel and its advantages for utilization in IC engines. **[7]**

b) A four stroke petrol engine develops 50 kW and consumes 16 liters of petrol per hour of specific gravity 0.755. The calorific value of fuel used is 44500kJ/kg. Find its indicated thermal efficiency. If engine runs at 3000 rpm. It develops the mean effective pressure of 5.2 bar. Determine the bore and length of stroke if stroke length is 1.1X bore. **[7]**

c) Write notes on HC Emission and their control. **[4]**

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Seat No.	

Total No. of Pages : 3

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

MACHINE TOOLS & PROCESSES

Sub. Code : 63364

Day and Date : Tuesday, 07 - 11 - 2017

Time : 10.00 a.m. to 01.00 p.m. **Total Marks : 100**

Instructions : 1) All Questions are compulsory.

2) Figures to the right indicate full marks

3) Assume suitable data, if necessary.

4) Use of Non-programmable Scientific Calculator is allowed.

Q1) Attempt any four (4 marks each) :

a) Explain the properties of molding sand . Suggest the methods to measure the same. [4]

b) State the function of riser in the gating system. [4]

c) What are the steps involved in gravity die casting. [4]

d) Draw neat sketch of cupola furnace and name the parts. [4]

e) List the defects related to molding process? Explain any two of them. [4]

Q2) Attempt any four (4 marks each) .

a) Briefly explain principle of rolling with neat sketch. [4]

b) Distinguish between open and closed die forging processes. [4]

c) Show by schematic sketches the process of forward extrusion. Give two examples of components produced by extrusion. [4]

d) Why is lubrication difficult in wire drawing process? State the methods generally employed in it. [4]

e) Indicate by means of flow diagram the different stages in manufacture of 50 mm diameter rod from a steel ingot. [4]

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Q3) Write a short note on (Any Three) :

a) Advantages and Limitations of sand casting process [6]

b) Defects in forging [6]

c) Injection molding [6]

d) Thermoforming process for plastic [6]

Q4) Attempt any four (4 marks each)

a) A lathe is provided with a change gear set from 20 to 125 teeth in steps of 5 teeth and an additional gear of 127 teeth. Find the gear train for cutting metric thread of 3 mm pitch on a lathe having lead screw pitch as 6 TPI. [4]

b) How are a capstan and turret lathe headstock classified? Describe any one of them. [4]

c) Describe in brief working principle of boring machine. [4]

d) Draw neat sketch of following operations performed on drilling machine. [4]

i) Countersinking

ii) Counterboring

e) Give the specification of lathe. [4]

Q5) Attempt any four (4 marks each) :

a) Explain the method of carrying out an operation on shaper. [4]

b) Outline the procedure of planning vertical surfaces. [4]

c) Make a neat sketch of Universal milling machine. State its advantages. [4]

d) What are various tool holding devices used on milling machine? [4]

e) Compare the gear shaving with gear rolling. [4]

Q6) Write a short note on (Any Three) :

a) Abrasive Jet Machining advantages & limitations [6]

b) Application of Electro- Chemical machining with neat sketch [6]

c) Water jet machining process [6]

d) Various operations performed on milling machine [6]

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester-IV) (Revised) Examination, November - 2017

THEORY OF MACHINES - I

Sub. Code : 63363

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **Attempt all questions.**
2) **Figures to the right indicates full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume suitable data, if necessary and state clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) a) Write a note on Grubler's criterion for planar mechanism. **[8]**

OR

a) Explain the inversions of single-slider crank chain with neat sketches. **[8]**

b) A reciprocating engine mechanism is shown in fig.1.b. Crank OC is 60 mm long and connecting rod CP is having length of 180mm. By using Klein's construction method, find the velocity and acceleration of the piston if the crank is rotating at 180 r.p.m. **[8]**

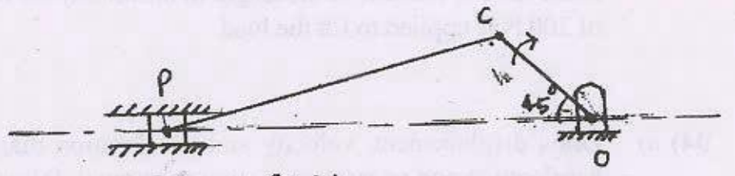


fig.1.b

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Q2) Crank OA of the quick return mechanism shown in fig. 2. revolves at a uniform speed of 250 r.p.m. in clockwise direction. The dimensions of various links are: OA = 75 mm, PQ = 375 mm, and QR = 400 mm. Crank makes 45° with vertical line PO. Find: i) velocity of R, ii) acceleration of R and iii) angular acceleration of QR. **[18]**

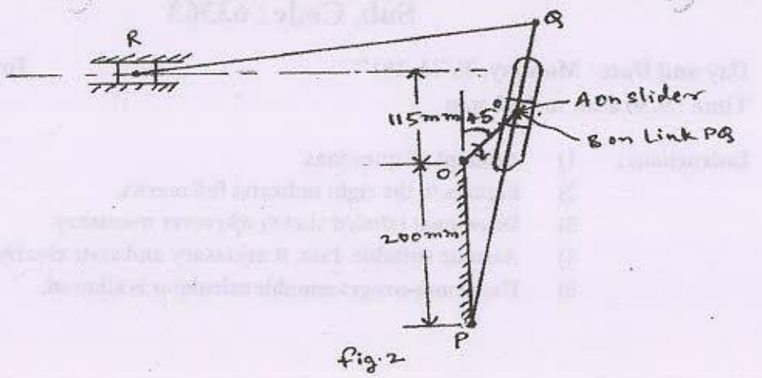


fig. 2

Q3) a) Derive the equation for friction torque in case of conical pivot bearing assuming uniform pressure with usual notations. **[8]**

OR

a) Derive the equation for friction torque in case of flat pivot bearing assuming uniform pressure condition. **[8]**

b) A screw jack has square threaded screw with mean diameter of 40 mm. The pitch of the thread is 6 mm and the coefficient of friction at the screw is 0.16. The load to be lifted is 25 kN and is supported by a collar having mean diameter of 50 mm and the coefficient of friction at the collar is 0.18. Determine the length of the tommy bar required if an effort of 200 N is applied to lift the load. **[8]**

Q4) a) Draw displacement, velocity and acceleration diagram for Uniform acceleration and retardation motion program of follower. **[4]**

b) A cam is operating an oscillating roller follower having SHM during outward and return stroke. Draw the cam profile for the following given data;

Distance of roller centre from cam centre at the start of ascent = 60 mm;

Follower arm length = 80 mm; Distance of pivot point from cam centre = 100 mm;

Angle of ascent = 60°; Angle of descent = 90°; Angle of dwell in between = 45°

Angle of oscillation of follower arm during ascent and descent = 15° **[14]**

Q5) a) Derive the equation of ratios of belt tensions in case of flat belt drive. **[6]**

OR

a) Explain slip and creep in belt. **[6]**

b) An open belt running over two pulleys 240 mm and 600 mm diameter connects two parallel shafts 3m apart and transmits 4 kW from smaller pulley that rotates at 300 rpm. Coefficient of friction between the belt and pulley is 0.3 and safe working tension is 10 N per mm width. Determine minimum width of belt, initial tension in belt. **[10]**

Q6) a) Explain controlling force and controlling curve. **[6]**

OR

a) Explain the terms height of governor, Isochronism and stability related to governor. **[6]**

b) In a porter governor, each of the four arms is 400 mm long. The upper arms are pivoted on the axis of rotation whereas the lower arms are attached to the sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and the load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of 250 mm and 300 mm of rotation of governor balls? **[10]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

ii) Discharge through nozzle = 0.18 m^3/s

iii) Area of the jet = 7500 mm^2

iv) Power available at the shaft = 44 kW

v) Mechanical efficiency = 94%

Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Seat No. [ ]

Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

ii) Discharge through nozzle = 0.18 m^3/s

iii) Area of the jet = 7500 mm^2

iv) Power available at the shaft = 44 kW

v) Mechanical efficiency = 94%

Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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Q2) a) What is governing of turbine? Explain governing of Francis turbine with neat sketch. [8]

b) An inward flow reaction turbine has outer diameter of 1m and inner diameter 0.5m. The vanes are radial at the inlet and discharge is radial at the outlet. Water enters vane at an angle of 10°. Assuming velocity of flow to be constant at 3m/sec. Find speed of the wheel and vane angle at outlet. [8]

OR

c) A Kaplan turbine works under head of 16m. Runner diameter is 2.5 times diameter of hub; speed of turbine is 105 rpm. Angle of vane tip at outlet extreme edge is 20° and K_f=0.6. [8]

Assume radial discharge.

Calculate i) Runner diameter

ii) Hub diameter

iii) Discharge through turbine

Q3) a) Define specific speed of pump and obtain expression of it. What is significance of it? [8]

b) Write short notes (any two) [10]

i) Priming and its necessity

ii) NPSH

iii) Derive expression for minimum starting speed of centrifugal pump.

OR

c) i) A centrifugal pump is running at 1000 rpm. The outlet vane angle of impeller is 45° and velocity of flow at out 2.5 m/sec. Discharge through pumps is 200 lit/sec working against total head of 20m. If manometric efficiency is 80%, find impeller diameter and width of impeller at outlet. [5]

ii) Centrifugal pump of impeller diameter 0.30m discharging 0.03 m^3/s water against a total head of 15 m and the pump is running at 1000 rpm. Find the discharge, head and ratio of power of a geometrically similar pump of diameter 0.15 m when it is running at 2500 rpm. [5]

Q4) a) Prove that the expression for volumetric efficiency in reciprocating compressor with effect of clearance volume is

$$n_v = 1 - \frac{V_C}{V_S}\left[\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} - 1\right]$$

Where,

V_c is Clearance volume, V_s is swept volume and P_2/P_1 is the pressure ratio. Also discuss the effect of Clearance ratio on the volumetric efficiency of the compressor. [8]

b) Write short notes on any two: [10]

i) Requirement of multistage of reciprocating compressors.

ii) Workdone by reciprocating compressor during adiabatic and isothermal compressions.

iii) Classification of reciprocating compressors.

OR

b) i) A single acting single stage compressor is belt driven from an electric motor at 400 rpm. The cylinder diameter is 15cm and the stroke 17.5 cm. The air is compressed from 1 bar to 7 bar and the law of compression $PV^{1.3}$ = Constant. Find the power of the motor, if transmission efficiency is 97% and the mechanical efficiency of compressor is 90%. Neglect clearance effect. [5]

ii) The pressure in the mains of compressor air service is to be 8 bar and a supply of 28 m^3/hr at 15°C and that pressure is to be maintained. The air is compressed from an initial pressure 1 bar by a two stage compressor in which the compression is adiabatic. The air is cooled to its initial temperature of 15°C in the inter cooler. What is the minimum power required to compress the air? Take R = 287 J/kgK. [5]

Q5) a) Explain the concept of Slip factor and Power input factor. [8]

b) A Centrifugal compressor delivers 40 kg of air per minute at a pressure of 3 bar and 120° C. The intake pressure and temperature of the air is 1 bar and 25°C. If no heat loss to the surrounding, find

i) Index of compression

ii) Power required, if the compression is isothermal

(Take R = 287 J/kgK and C_p = 1.005 J/kgK) [8]

OR

b) A cantilever of length 2 m carries a UDL of 2 kN/m over a length of 1 m from the free end and a point load of 1kN at the free end. Find the slope and deflection at the free end if $E=2.1\times10^5 N/mm^2$ and $I=6.667\times10^7 mm^4$ **[8]**

OR

b) State the importance of theories of failure and explain the maximum Principal stress theory. **[8]**

Q6) a) State the assumptions made in Euler's column theory and derive its expression for the crippling load when both the ends of the column are hinged. **[8]**

b) The maximum stress produced by pull in bar of length 1m is 150 N/mm^2. The area of cross sections and lengths are as shown in fig.5. Calculate the strain energy stored in a bar if $E=2\times10^5 N/mm^2$ **[8]**

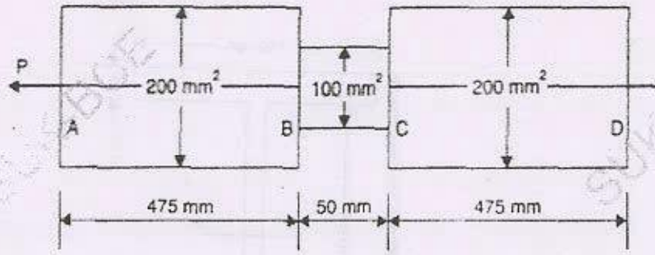


Fig. 5

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Total No. of Pages :4

Seat No.

S.E. (Mechanical) (Semester - IV) Examination, November - 2017
ANALYSIS OF MECHANICAL ELEMENTS
Sub. Code:63361

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary and state it clearly.**
3) **Figures to the right indicate full marks.**
4) **Draw neat and labeled sketches wherever necessary.**
5) **Use of non programmable calculator is allowed.**

Q1) a) Three pillars two of aluminum and one of steel support a rigid platform of 200 kN as shown in the fig.1. If area of each aluminum pillar is 1000 mm^2 and that of steel pillar is 800mm^2, find the stresses developed in each pillar.

Take$E_a = 1\times10^5 N/mm^2$ and $E_s = 2\times10^5 N/mm^2$. What additional load P, can it take, if working stresses are 65N/mm^2 in aluminum and 150N/mm^2 in steel? **[12]**

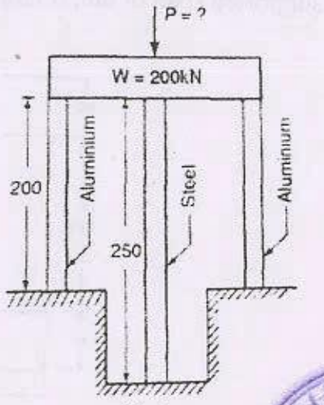


Fig.1

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b) Explain thermal stresses and hence derive the expression for thermal stress induced in a bar with its ends fixed by rigid support. **[6]**

OR

b) A hollow circular shaft 200 mm external diameter and thickness 25mm is transmitting power at 200 rpm. The angle of twist over the length of 2m was found to be 0.5°. Calculate the power transmitted and the maximum shear stress induced in the shaft. Take modulus of rigidity as 84 kN/mm² **[6]**

2) Draw SFD and BMD for loading condition shown in fig 2. Locate point of contraflecture and maximum bending moment if any. **[16]**

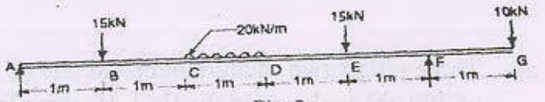


Fig. 2

)3) A cast iron beam has I section with top flange 80 mm ×40 mm, wed 120 mm ×20mm and bottom flange 160 mm×40 mm. as shown in Fig 3 if tensile stress is not to exceed 30 N/mm² and compressive stress 90N/ mm²,what is the maximum UDL the beam can carry over a simply supported span of 6m, if larger flange is in tension.

16]

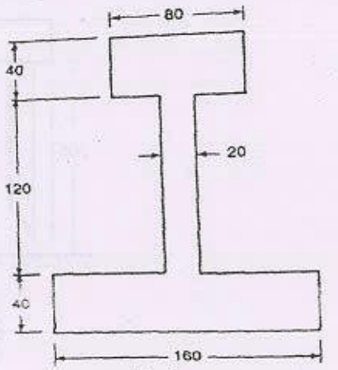


Fig. 3

4)a) Derive the expression for the principal stresses and the maximum shear stress for a member subjected to simple shear stress. Show the locations of Principal Planes and Planes of Maximum shear stress. **[9]**

b) At a point in a strained material the principal stresses are 140N/mm² (tensile) and 60 N/mm² (compressive). Determine the normal stress, shear stress and the resultant stress on a plane inclined at 45°to axis of major Principal stress. What is the intensity of maximum shear stress at the point? **[9]**

OR

b) An I-section beam 350mm ×150mm has a wed thickness of 10mm and a flange thickness of 20mm.(Fig.4) If the shear force acting on the section is 40 kN, find the maximum shear stress developed in the I-section. Also sketch the shear stress distribution across the section. **[9]**

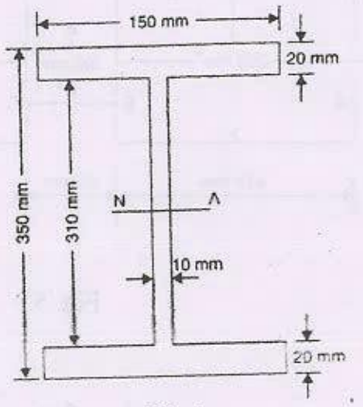


Fig.4

Q5) a) Derive the expression for slope and deflection of a simply supported beam subjected to an UDL for the whole span, using double integration method. **[8]**

Seat No.

S.E. (Mechanical Engineering) (Semester - III) (Revised)
Examination, November - 2017
FLUID MECHANICS
Sub. Code : 63354

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Neat diagrams must be drawn wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of non programmable calculator is allowed.**
5) **Assume suitable data if necessary.**

Q1) a) Define viscosity, surface tension and capillarity and write their units in S.I. system. **[6]**

b) A thin square plate 1m × 1m is placed horizontally at the centre in a horizontal gap of height 2 cm filled with oil of viscosity 10 poise. The plate is pulled at a constant velocity of 0.1 m/s. Find the force on the plate.

If the gap is now filled with another oil. When the plate is placed at a distance of 0.5 cm from one of the surfaces of the gap and pulled with the same velocity, if the force on the plate remains same as before, find the viscosity of the new oil. **[6]**

c) Define Buoyancy and meta centre. **[4]**

Q2) a) Distinguish by giving examples, Laminar and Turbulent flow, Steady and Unsteady flow, Uniform and Non uniform flow and Compressible and Incompressible flow. **[8]**

b) Solve any one of the following : **[8]**

i) Find the value of a such that the flow field given by

$V = (axy - z^3)i + (a - 2)x^2j + (1 - a)xz^2k$ is irrotational.

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ii) An air plane flies at an altitude where the pressure and density of air are 40 KN/m² and 0.58 Kg/m³ respectively. If the stagnation pressure measured by a pitot tube is 57 KN/m², compute the speed of the aeroplane and the stagnation temperature and stagnation density. Take R = 287J/Kgk and ratio of specific heats is 1.4.

3) a) i) Bernoulli's theorem is based on which principle? Give its statement. Name three devices where Bernoulli's equation is applied. [4]

ii) Derive an expression for discharge over a triangular notch in terms of head of liquid over the crest of the notch and the included angle. [5]

b) Solve any one of the following : [9]

i) A venturimeter is used for the measurement of discharge of water in a horizontal pipeline. The pipe diameter is 20 cm and the throat diameter is 12 cm. When the flow of 130 lit/sec is flowing, the attached manometer shows a head difference of 50 cm if the coefficient of discharge of the venturimeter is 0.98 find the density of manometric fluid in the manometer.

ii) A circular tank of diameter 3 mt contains water up to a height of 4 mt. If the water is discharged through a 10 cm diameter orifice at the bottom of the tank, find the height of water above the orifice after 5 minutes Assume coefficient of discharge of orifice is 0.63.

4) a) i) Discuss the applications of momentum equation. [4]

ii) Explain with a neat sketch how pitot tube is used to measure discharge through pipe. [4]

b) An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drop in 100 mt. length of the pipe is 1800 KN/m² determine [8]

i) Wall shear stress and frictional drag for 100 mt. length.

ii) Power required to maintain the flow.

iii) The velocity gradient at the pipe wall.

iv) The velocity and shear stress at 8 mm from the wall.

5) a) i) Explain the concept of equivalent pipe. [5]

ii) Discuss the causes of minor energy losses in flow through pipes. [4]

b) Solve any one of the following : [9]

i) Three pipes of diameters 30 cm, 20 cm and 40 cm and lengths 450 mt, 255 mt and 315 mt respectively are connected in series. The difference in water surface levels in two tanks is 18 mt. Determine the rate of flow of water if coefficients of friction are 0.0075, 0.0078 and 0.0072 respectively considering

A) Minor losses also B) Neglecting minor losses.

ii) A horizontal pipe line 15 cm in diameter is joined by sudden enlargement to 25 cm diameter pipe. Measurements indicate that when flow is from smaller to larger cross section the head loss is 0.5 mt in excess of that when the flow takes place from larger to smaller section. Determine flow rate. Take coefficient of contraction $C_c = 0.63$.

6) a) What do you mean by boundary layer separation? Why does it occur? With neat sketches explain the methods used to control the separation of boundary layer. [8]

b) Solve any one of the following : [8]

i) A geometrically similar model of an air duct is built to 1 : 25 scale and tested with water which is 50 times more viscous and 800 times denser than air. When tested under dynamically similar conditions the pressure drop is 2 bar in the model. Find the corresponding pressure drop in the full scale prototype.

ii) Define pressure drag and skin drag or shear drag. A 2.5 mt long body having a projected area of 2.4 m² normal to the direction of motion is having a viscosity of 0.0012 Ns/m². Find the drag on the body if it has drag coefficient of 0.45 for Reynolds number of 7×10^6.

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Seat No.	

S.E. (Mech) (Part - II) (Semester-III) (Revised)
Examination, November - 2017
METALLURGY
Sub. Code : 63353

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any three questions from each section.**
2) **Answers for both sections to be written in the same answer book.**
3) **Figures to the right indicate full marks.**
4) **Draw neat figures wherever necessary.**

SECTION-I

Q1) Answer any three of the following. Each question carries equal marks. **[18]**

a) With neat sketches. Explain the process of Solidification by nucleation, crystallization and growth.

b) Explain the phenomenon of coring using equilibrium diagram? How can be cored structures avoided or eliminated?

c) Draw a typical equilibrium diagram for impure/ partial eutectic systems and explain the cooling and solidification of any hypoeutectic alloy from above melting temperature to room temperature and draw the room temperature structure.

d) Draw the crystal structures of BCC and FCC and evaluate the number of atoms per unit cell for both.

Q2) a) Draw Fe-Fe_3C equilibrium diagram. Indicate all the phases. Temperatures and Compositions. **[8]**

b) What is SG Iron? Explain the process of manufacturing SG Iron. Draw the microstructure of SG iron and Gray Cast iron and compare their properties. **[8]**

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Q3) a) Draw typical equilibrium diagram of A1-Cu alloy system? Explain the process of precipitation hardening treatment and its effects. Write the applications. [7]

b) Draw self explanatory sketches of any three. [9]

i) Substitutional and interstitial type solid solution.

ii) Microstructure of white and malleable cast irons.

iii) Microstructure of 0.4 and 1.2% carbon steel .

iv) Microstructure of 70:30 brass as cast and annealed

v) X-ray Radiography.

vi) SN curve and Creep curve.

Q4) Write short notes on any four. [16]

a) Solid solutions.

b) Tool steels.

c) Ferritic Stainless steels.

d) Dye Penetrant Testing.

e) Impact Testing.

SECTION-II

)5) a) Draw flowchart for carbide cutting tools manufactured by powder metallurgy techniques, why pre-sintering is necessary in such tools? [9]

b) Classify different types of heat treatment furnaces? Explain rotary hearth furnace with neat sketch? [9]

6) a) Explain precipitation in A1–Cu alloys with respect to composition, aging time and temperature, over-aging? [8]

b) Classify case carburizing methods? Explain pack carburizing with neat sketch. [8]

Q7) Differentiate clearly between any four of the following. [16]

a) Hardening and Tempering.

b) Flame and Induction hardening.

c) TTT and CCT curves.

d) Pearlite and ferrite.

e) Annealing and normalizing.

Q8) Write short notes on any four of the following. [16]

a) Liquid phase sintering.

b) Induction hardening.

c) heat treatment defects.

d) Bainitic transformation.

e) Self lubricating bearing.

✡ ✡ ✡

)6) a) Define the following as related to steam turbine. [8]

i) Speed ratio

ii) Blade velocity coefficient

iii) Diagram efficiency

iv) Stage efficiency

OR

Explain the pressure compounding of impulse turbine showing pressure and velocity variations along the axis of the turbine.

b) The following particulars refer to a stage of a Parson's turbine comprising one ring of fixed blades and one ring of moving blades.

Mean diam. of blade ring = 70 cm

Speed of turbine = 3000 rpm

Steam velocity at exit from blade = 160 m/s

Blade outlet angle = 20°

Steam flow rate = 7 kg/s

Draw velocity diagram & find

i) Blade inlet angle

ii) Tangential force

iii) Power developed

EEE

Total No. of Pages : 4

Seat No.

S.E. (Mech.) (Part - II) (Semester - III) Examination, November - 2017

APPLIED THERMODYNAMICS

Sub. Code: 63352

)ay and Date :Wednesday, 15 - 11- 2017 Total Marks : 100

'ime :10.00 a.m. to 1.00 p.m.

nstructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Draw neat sketch wherever necessary.
5) Use of steam table, mollier chart and non-programmable calculator is allowed.

)1) a) State and prove Carnot Principle. [8]

OR

b) Prove that Entropy of an isolated system during a process always increases. [8]

c) An insulated cylinder of volume capacity 4 m^3 contains 20 kg of nitrogen. Paddle work is done on the gas by stirring it till the pressure in the vessel gets increased from 4 bar to 8 bar. Determine change in entropy. Take for nitrogen C_p = 1.04 kJ/kgK and C_v = 0.7432 kJ/kgK. [8]

Q2) a) Write a note on steam tables and Mollier chart. [8]

OR

b) Write a note on Reheat and Regenerative steam power cycles. [8]

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c) A steam turbine receives steam at a pressure of 20 bar and superheated to 87.6°C. The exhaust pressure is 0.07 bar and the expansion of steam takes place isentropically. Calculate following using steam table **[10]**

i) Heat supplied

ii) Heat rejected

iii) Net work done

iv) Thermal efficiency

v) SSC.

3) a) Classify boilers. Compare water tube boilers with fire tube boilers. **[8]**

OR

b) What is function of air pump in condenser? Explain with neat sketch working of Edward's air pump. **[8]**

c) A prime mover uses 15,000 kg of steam per hour develops 2450 kW. The steam is supplied at 30 bar and 350°C. The exhaust from the prime mover is condensed at 725 mm of Hg when barometer reads 755 mm of Hg. The condensate temperature from the condenser is 31°C and the rise in circulating water temperature is 10°C. Determine: **[8]**

i) The quality of steam entering the condenser.

ii) The quantity of circulating water required.

iii) Cooling ratio.

Assume that no air is present in the condenser.

4) a) What is the function of the nozzle? Describe different types of steam nozzles with suitable sketch. **[8]**

OR

b) Explain the terms, degree of under cooling and degree of super saturation. What are the effects of supersaturation? **[8]**

c) Steam at a pressure of 15 bar and dryness fraction 0.97 is discharged through a convergent- divergent nozzle to a back pressure of 0.2 bar. The mass flow rate is 9 kg/kwh. If the power developed is 220 kW. Determine **[8]**

i) Throat pressure.

ii) Number of nozzles required if each nozzle has a throat of rectangular cross section of 4 mm × 8 mm.

5) a) Classify the turbines and compare impulse turbine with reaction turbine. **[8]**

b) A impulse turbine has exit steam velocity from a nozzle equal to 900 m/s. The nozzle makes an angle of 20° to the tangent of the rotating wheel. The main blade speed is 300 m/s. The blades are equiangular. The mass of steam flowing through the turbine is 1200 kg/hr. Calculate **[9]**

i) The blade angles.

ii) The blade efficiency.

iii) The power developed.

Take blade velocity co-efficient = 0.85.

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Semester - III)
Examination, November - 2017
ELECTRICAL TECHNOLOGY
Sub. Code : 63351

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate marks.**
3) **Draw neat figures wherever necessary**
4) **Assume suitable data, if missing. State it clearly.**

SECTION - I

Q1) a) Derive the expression for speed and torque of dc motor. **[1 × 8]**

OR

Draw circuit diagrams and torque speed characteristics of dc shunt motor, dc series motor and dc cumulative compound motor.

Answer any two of the following (b, c, d). **[2 × 6]**

b) Draw the diagram and explain the working of 4 point starter.

c) Explain the basic methods of electric braking of dc motor.

d) A DC series motor runs at 1200 rpm driving a constant torque load by taking 10 A current from 200V supply. Now 5 ohm resistance is connected in series with the motor. Find the new armature current and new speed. The armature resistance is 0.6 ohm. Field resistance is 0.5 ohm.

Q2) Answer any TWO **[2 × 8]**

a) State three advantages of using 3 phase induction motor rather than dc motor. Describe the construction of cage type rotor.

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b) Torque of 3 phase induction motor is given by $\frac{120\, s\, E_2^2\, R_2}{2\pi N_s \left(R_2^2 + S^2\, X_2^2\right)}$

where E_2 ,R_2, X_2 , s, N_s are rotor induced emf per phase at standstill, Rotor resistance per phase, Rotor reactance per phase at standstill, slip and synchronous speed respectively. Write the value of slip and expression for torque at

i) Starting

ii) When the torque is maximum

iii) If rotor speed=Synchronus speed.

c) A 4 pole, 230V, 50Hz, 3 phase induction motor draws 10A at ( ) pf while running at 1450rpm. The stator loss is 100W, frictional loss is 100W. Find the rotor Cu loss. Neglect the rotor iron loss and find efficiency of the motor.

Q3) Answer any TWO **[2 × 8]**

a) Why DOL starter should be used for small rating motors? Describe DOL starter for 3 phase induction motor.

b) Describe rotor side speed control methods of 3 phase induction motor.

c) Explain the 'constant v/f' speed control method. Why it is the most popular method these days?

SECTION - II

Q4) Answer any TWO **[2 × 8]**

a) What are the desirable properties of servo motor? Describe methods of controlling dc servo motor.

b) Describe a linear induction motor. State its applications.

c) State advantages of brushless dc motor over conventional de motor. How is commutation obtained in BLDC motor?

Q5) Answer any TWO **[2 × 8]**

a) Explain the factors to be considered for selecting a motor for a particular drive.

b) Explain with examples the terms- active load, passive load, multimotor drive.

c) Classify mechanical loads based on how the torque requirement changes with driving speed. Explain.

Q6) Answer any TWO **[2 × 8]**

a) Compare direct arc type furnace with indirect arc furnace in all aspects.

b) Describe the set up and operation for eddy current heat treatment of metallic parts.

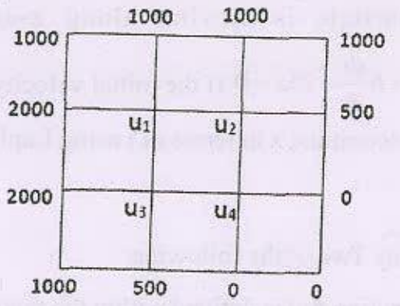
c) A 200 kW resistance oven is to be operated in such a way that its maximum temperature is not to exceed 1700°C. The initial temperature of the charge is 420°C. If heating element is a wire of diameter 0.6 cm is used, find the length required. Also find resistance of heating element.

Radiating efficiency =0.5, Emissivity = 0.5, Specific resistance of heating element= 150×10^{-6} ohm-cm.

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iv) $u(x, \infty)$ is finite

b) Solve the Laplace equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown in figure by Gauss-Siedal iterative method by per. [16]



Total No. of Pages : 4

Seat No.

S.E. (Mechanical Engg.) (Semester - III) (Revised) Examination, November - 2017

ENGINEERING MATHEMATICS - III

Sub. Code : 63350

Day and Date : Friday, 10 - 11 - 2017 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.
4) Assume suitable data if necessary.

SECTION - I

Q1) Attempt any Three of the following.

a) Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 3\sin x + 4\cos x$ with $y(0) = 1$ and $y'(0) = 0$. [6]

b) Solve $(D^2 + D+1)y = (1- e^x)^2$ [6]

c) Solve $(D^2 +5D + 4)\, y = 3 - 2x$ [6]

d) Solve $x^2\frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = e^x$. [6]

Q2) Attempt any one of the following.

a) The whirling speed of a shaft of length l is given by $\frac{d^4y}{dx^4} - a^4y = 0$,

where $a^4 = \frac{Ww^2}{gEI}$ and y is the displacement at distance x from one end. If the ends of the shafts are considered in long bearing so that the slope at each end is zero, show that the shaft will whirl when cos al cosh al =1. [16]

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b) i) The motion of particle is given by $\frac{d^2s}{dt^2}+k^2\frac{ds}{dt}=0$. At $t = 0$, $s=s_0$ and $\frac{ds}{dt}=v_0$ show that as time $t\to\infty, s=s_0+\frac{v_0}{k^2}$ **[8]**

ii) A spring for which stiffness K = 700 Newton / m hangs in a vertical position with its upper end fixed. A mass of 7 kg is attached to the lower end. After coming to rest, the mass is pulled down to 0.05 m and released Discuss the resulting motion of the mass, neglecting air resistance. **[8]**

Q3) Attempt any two of the following.

a) If $\vec{a}$ is a constant vector, $\vec{r}=x\vec{i}+y\vec{j}+z\vec{k}$ and $r=\sqrt{x^2+y^2+z^2}$ then find

i) $\nabla.\left(\frac{\vec{a}\times\vec{r}}{r}\right)$ and show that ii) $\nabla r^n=nr^{n-2}\vec{r}$ **[8]**

b) Show that $\vec{F}=(z^2+2x+3y)\vec{i}+(3x+2y+z)\vec{j}+(y+2xz)\vec{k}$ is irrotational but not solenoidal and hence find scalar potential **[8]**

c) Find the directional derivative of $\phi=x^2+2y^2-3z^2$ at (1, 2, 1) in the direction **[8]**

i) Normal to $xy^2+yz^3=4$ at (1, –1, 1)

ii) tangent to $x=t^2+t, y=2t, z=2-t$ at $t=1$

SECTION - II

Q4) Attempt any three from the following:

a) Find the Laplace transform of $\frac{d}{dt}\left(\frac{\sin t}{t}\right)$ **[6]**

b) Find $L\left\{\int_0^t x\cosh x dx\right\}$ **[6]**

c) Find inverse Laplace transform of $\log\left(1+\frac{a^2}{s^2}\right)$ **[6]**

d) A particle is moving along x-axis according to the law $\frac{d^2x}{dt^2}+6\frac{dx}{dt}+25x=0$. If the initial velocity is 12 meters per second to the left, determine x in terms of t using Laplace transform method. **[6]**

Q5) Attempt any Two of the following:

a) A function $f(x)$ is defined within the range $(0, 2\pi)$ as **[8]**

$$f(x)=\begin{cases}x & \text{if } 0<x<\pi\\ 2\pi-x & \text{if } \pi<x<2\pi\end{cases}$$

Express f(x) as a Fourier series in the range $(0, 2\pi)$

b) Find Fourier series with period 3 to represent $f(x) = 2x - x^2$ in the range $(0, 3)$ **[8]**

c) Find half range cosine series for $f(x) = \sin x$ in the range $(0, \pi)$ and hence deduce that $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots\ldots=\frac{\pi}{4}$. **[8]**

Q6) Attempt any one from the following.

a) Solve $\frac{\partial u}{\partial t}=a^2\frac{\partial^2 u}{\partial x^2}$ if $u(x, t)$ satisfies the following conditions. **[16]**

i) $u(0, t) = 0$ for all t

ii) $u(l, t) = 0$ for all t

iii) $u(x,0)=\begin{cases}x & \text{if } 0\le x\le l/2\\ l-x & \text{if } l/2\le x\le l\end{cases}$

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Total No. of Pages : 2

Seat No.	

B.E. (E & Tc) (Semester-VIII) Examination, November - 2017
OPERATING SYSTEM (Elective - II)
Sub. Code : 67822

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are Compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume data wherever necessary.**

SECTION-I

Q1) Attempt any two: **[16]**

a) What is a bootloader and explain in detail?

b) Draw and explain complete set of process state transitions?

c) Explain semaphore. How mutual exclusion can be achieved using semaphore?

Q2) Attempt any two: **[16]**

a) How do you prevent deadlock in taking place.

b) Draw the static & dynamic components of a process.

c) Draw & briefly explain the block diagram of System Kernel?

Q3) Write short notes on any three: **[18]**

a) The logical format of executable file.

b) Deadlock and starvation.

c) System calls.

d) Messaging.

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SECTION-II

Q4) Attempt any two: [16]

a) Explain in detail dynamically partitioned memory allocation scheme?

b) Explain in detail interrupt driven I/O system.

c) Draw the block diagram of Unix system kernel? Explain File subsystem & process control block?

Q5) Attempt any two: [16]

a) List the different reasons or cases for which kernel has to swap process out? Explain swapping process out?

b) Explain real time systems.

c) Explain working of page stealer process.

Q6) Attempt any three: [18]

a) Allocation of frames.

b) Fragmentation.

c) Kernel I/O subsystem.

d) Page fault.



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Total No. of Pages : 2

Seat No.	

B.E. (E & TC) (Part - IV) (Semester - VII) (Old)
Examination, November - 2017
WIRELESS COMMUNICATION (Pre Rev)
Sub. Code : 47927

Day and Date : Monday, 13 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION - I

Q1) Attempt any two **[2 × 8 = 16]**

a) What is WLL? Explain in detail.

b) Explain the concept of frequency reuse.

c) Compare 2G and 3G wireless network.

Q2) Attempt any two **[2 × 8 = 16]**

a) Explain in detail two - ray ground reflection model.

b) Explain diffraction and scattering in mobile radio propagation.

c) Write a note on Fading effects due to Doppler spread.

Q3) Attempt any two **[2 × 9 = 18]**

a) Derive the equation for free space propagation model.

b) Explain Small - Scale multipath measurements.

c) Explain in detail Rayleigh & Ricean distribution.

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SECTION - II

Q4) Attempt any two **[2 × 8 = 16]**

a) Compare FDMA & TDMA.

b) Explain any two spread spectrum multiple access.

c) Discuss signalling system 7.

Q5) Attempt any two **[2 × 8 = 16]**

a) Explain Global System for mobile

b) Explain IEEE - 802.11 standards.

c) Explain DECT functional concept.

Q6) Write a note on any three **[3 × 6 = 18]**

a) Personal Communication Services.

b) ISDN

c) X.25 Protocol

d) Network access protocol.

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Seat No.	

Total No. of Pages : 2

B.E. (E&TC) (Part -II) (Semester - VIII) Examination, November - 2017

MOBILE COMMUNICATION (Elective -II) (Pre-Revised) (Old)

Sub. Code : 49521

Day and Date :Monday, 06 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) Solve any two. **[16]**

a) Explain in detail HSCSD (High speed Net. Switched Data) in GSM.

b) Draw and explain dial-vp data connection in an analog cellular network.

c) What is meant of bine-tooth? Describe in detail bine-tooth technology

Q2) Solve any two. **[16]**

a) Draw and explain CDPD-Network architecture.

b) Explain FHSS and DSSS offered by IEEE 802.11.

c) Explain packet switched data services on cellular network.

Q3) Write notes on any three. **[18]**

a) Wireless ATM

b) IP packet delivery

c) Minimal encapsulation

d) Mobile and wireless devices

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SECTION - II

Q4) Solve any two. **[16]**

a) Explain TCP over 2.5/3G wireless network. What characteristics have to be considered and configuration parameters to adopt TCP?

b) How and why does I-TCP isolates problems on the wireless link? What are the main drawbacks of this solution?

c) Explain security services in wireless system.

Q5) Solve any two. **[16]**

a) Explain Transmission/Time out freezing and selective retransmission.

b) Draw WAP push architecture and explain various protocols used in Push architecture.

c) Explain with neat diagram WTLS secure session establishment and datagram transfer.

Q6) Write notes on any three. **[18]**

a) Advantages and disadvantages of VPN

b) File systems

c) Sync. ML.

d) W.W.W.

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Total No. of Pages : 2

Seat No.	

B. E. (Electronics & Telecommunication Engineering) (Semester - VII) Examination, November - 2017

EMBEDDED SYSTEM (Revised)

Sub. Code : 67629

Day and Date : Monday, 13 - 11 - 2017

Time : 02.30 p.m. to 05.30 p.m. **Total Marks : 100**

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Assume suitable data if necessary.

Q1) Attempt any two of the following : **[2 × 8 = 16]**

a) Draw and Explain Pin out diagram of PIC Microcontroller.

b) Explain with example Direct and Indirect addressing accessing in PIC Microcontroller.

c) Write assembly program to generate a square wave at RB1 pin with 50% duty cycle.

Q2) Attempt any two of the following : **[2 × 9 = 18]**

a) Draw and Explain Capture Mode of PIC16F877 also explain CCPxCON Register.

b) Draw and Explain block diagram of Timer 0 of PIC16F877 also explain OPTION register related to Timer 0.

c) Explain I^2C and SPI mode of serial communication in PIC16F877.

Q3) Attempt any two of the following : **[2 × 8 = 16]**

a) Define Embedded System and explain components of an Embedded System.

b) Explain embedded software development process and tools.

c) Discuss Hardware-Software design and co-design issues.

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Q4) Attempt any two of the following : **[2 × 8 = 16]**

a) Explain the RISC architecture design philosophy.

b) Explain the concept of pipeline in ARM7 along with example.

c) Explain various modes of operation of CPU in ARM7.

Q5) Attempt any two of the following : **[2 × 9 = 18]**

a) Write the features of timers in LPC2148. Also give the names and use of all SFR's required for configuring timer module in LPC2148.

b) Write an embedded C program for LPC2148 to toggle the LED's connected to pins P0.4 to P0.7 for five times.

c) Write the features of IO ports in LPC2148. Also give the names and use of all SFR's required for configuring IO ports in LPC2148.

Q6) Attempt any two of the following : **[2 × 8 = 16]**

a) Explain with pseudo code, the Round Robin software architecture.

b) What is Task? Draw and explain Task state diagram.

c) What is a re-entrant function, explain with example? Also list the precautions that must be taken while using semaphores.

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Total No. of Pages : 2

Seat No.	

B.E. (Electronics and Telecommunication) (Semester - VII) Examination, November - 2017

COMPUTER COMMUNICATION NETWORKS (New)

Sub. Code : 67630

Day and Date : Wednesday, 15 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions :
1) **All questions are compulsory**
2) **Figures to the right indicate full marks.**
3) **Draw diagrams wherever necessary.**
4) **Assume suitable data if necessary.**

SECTION - I

Q1) Attempt any TWO from THREE **[16]**

a) Compare OSI & TCP/IP reference model.

b) Explain categories of networks.

c) Explain different framing Methods in DLL?

Q2) Attempt any TWO from THREE **[16]**

a) Define Hamming Distance. Explain Hamming Code used as Error-Correcting Code.

b) Explain CSMA protocols.

c) Explain Go-back-N protocol.

Q3) Write note on any THREE **[18]**

a) Networking Devices

b) Modem standards.

c) Guided Media

d) HDLC frame format

e) Gigabit Ethernet

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SECTION - II

Q4) Attempt any TWO [16]

a) Explain open loop congestion control.

b) What is ICMP? Explain error reporting messages in ICMP.

c) Explain RSA algorithm.

Q5) Attempt any TWO [16]

a) Compare Virtual Circuits and Datagram.

b) Explain symmetric key cryptography.

c) Explain Distance Vector Routing algorithm with suitable example.

Q6) Write a short note on - (any THREE) [18]

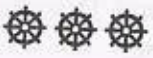
a) Choke packets

b) UDP header format

c) ARP

d) Digital Signature

e) Flooding



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Total No. of Pages :2

Seat No.	

B.E. (Part - IV) (Electronics & Telecom. Engg.) (Semester - VII) Examination, November - 2017

RF & MICROWAVE ENGINEERING (Revised)

Sub. Code : 67631

Day and Date : Tuesday, 21- 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m to 05.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) Attempt any two of the following:

a) Derive field equation for TE mode in rectangular wave guide. Show that TE_{10} is dominent mode. **[8]**

b) The TE_{10} mode is propagated in a rectangular waveguide of dimensions a = 6cms and b=40cms.By means of a travelling detector, the distance between a maximum and minimum is found to be 4.55 cm. Find the frequency of the wave. **[8]**

c) Explain power losses in waveguide. **[8]**

Q2) Attempt any two of the following:

a) Explain isolators with constructional details and how faradays rotation in ferrites is used as advantage in construction & isolator. **[8]**

b) With & matrix explain magic tee. **[8]**

c) Explain types & working of directional coupler with S parameters. Mention its application. **[8]**

Q3) Attempt any two of the following:

a) A two cavity klystron amplifier has the following characteristics voltage gain = 15db, Input power = 5mw Rsh of input cavity = 30 kΩ, RL (Load impedance) = 40 kΩ determine 1) The input rms voltage 2) the output rms voltage 3) the power delivered to the load. **[9]**

b) Differentiate between TWT and Klystron. **[9]**

c) Explain magnetron construction, working and types. **[9]**

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SECTION - II

Q4) Solve any two.

a) Explain with diagram IMPATT Diodes. [8]

b) Explain Tunnel diode with energyband diagram. [8]

c) What is Gunn effect? Explain using two valley theory. [8]

Q5) Solve any two.

a) Explain Industrial scientific-medical (ISM) applications of Microwave. [8]

b) Two identical 30dB directional couplers. are used to sample incident and reflected power in a waveguide. VSWR.=2 and the output of the coupler sampling Incident power = 4.5 mw. What is the value of reflected power? [8]

c) Explain different microwave power measuring techniques. Also explain how to measureVSWR using different techniques. [8]

Q6) Solve any two.

a) Write a note on materials for MMIC. [9]

b) Explain microwave hazards HERO, HERF and HERP. [9]

c) Explain different MMIC fabrication techniques and also explain thin film formation in monolithic microware integrated circuit. [9]

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Total No. of Pages : 2

B.E. (Electronics & Telecommunication Engineering)
(Semester - VII) Examination, November - 2017
ROBOTICS (Elective - I)
Sub. Code : 67632

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions: 1) **All questions are compulsory.**
2) **Figure to right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) Attempt Any TWO of the following **[2 × 8 = 16]**

a) Explain Power Transmission system in detail.

b) Explain in detail classification of robot by Control Method.

c) Explain basic control system model with Transfer function and Block Diagram.

Q2) Attempt Any THREE of the following **[3 × 6 = 18]**

a) Explain Accelerometer Sensor.

b) Explain history of Robotics.

c) Explain Control System Analysis.

d) Explain Slip sensor & Tactile sensor.

Q3) Attempt Any TWO of the following **[2 × 8 = 16]**

a) Explain in detail classification of robot by Co ordinate system Method.

b) Explain Proximity Sensor in detail.

c) Explain optical Position Sensor

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Q4) Attempt Any TWO of the following [2 × 8 = 16]

a) Explain Application of robot in Machine Loading and Unloading.

b) Explain mechanical gripper in detail.

c) Explain significance of WAIT, SIGNAL and DELAY commands using suitable example.

Q5) Attempt Any THREE of the following [3 × 6 = 18]

a) Explain generation of robot programming Language in detail.

b) Explain Robot End Effectors Interface.

c) Explain Textual Robot Language.

d) Explain Consideration in Gripper Selection & design.

Q6) Attempt Any TWO of the following [2 × 8 = 16]

a) Explain Application of robot in Spray coating.

b) Explain Lead Through Programming Method.

c) Explain Spot Welding.

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Total No. of Pages :2

Seat No.	

B.E. (Electronics & Telecommunication) (Semester - VIII) (Revised) Examination, November - 2017

DIGITAL IMAGE PROCESSING

Sub. Code: 67818

Day and Date :Friday, 03 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) Attempt any two of the following: **[2×8=16]**

a) Explain basic concept of sampling and quantization of images to convert in digital form.

b) Draw the structure of human eye and explain elements of visual perception.

c) Explain the components of image processing system with neat block diagram.

Q2) Attempt any two of the following: **[2×8=16]**

a) Explain power law transformation and log transformation with their characteristic curve.

b) Explain Haar transformation.

c) What is meant by histogram of an Image? Explain the significance of histogram equalization

Q3) Attempt any two of the following: **[2×9=18]**

a) Explain the significance of first order and second order derivative for image sharpening.

b) Explain high pass filters in frequency domain.

c) Explain linear and non - linear smoothing filters in spatial domain.

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Q4) Attempt any two of the following: **[2×8=16]**

a) Explain Hit - or - Miss transform in detail.

b) Explain Erosion operation in detail along with mathematical expressions and example.

c) What is use of region filling algorithm? Explain the steps for region filling inside an object in an image with example.

Q5) Attempt any two of the following: **[2×8=16]**

a) Explain region splitting and merging algorithm in detail.

b) What is global and adaptive thresholding, explain in detail

c) How to detect a line or edge in an image explain with an example?

Q6) Attempt any two of the following: **[2×9=18]**

a) What is coding redundancy? Explain with the help of example.

b) What is lossy predictive coding, explain in detail.

c) Draw the block diagram of image compression model and explain in detail.

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Total No. of Pages : 2

Seat No.	

T.E. (Electronics and Telecommunication) (Semester - VI) Examination, November-2017

Optical Communication and Networks (Revised)

Sub. Code : 66919

Day and Date : Monday, 06 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions :
1) **All questions are compulsory**
2) **Figures to the right indicates full marks.**
3) **Assume suitable data if necessary and state it clearly.**
4) **Planck's constant h = 6.626×10^{-34} , speed of light c=2.998×10^{8} charge of electron e =1.602×10^{-19}**

Q1) Attempt any two of the following:

a) State the advantages of optical fiber communication? **[18]**

b) Briefly explain the names & designations of spectral bands used for optical communication?

c) A silica optical fiber with a core refractive index of 1.41 and relative refractive index difference of 2%. Determine

i) the critical angle at the core-cladding interface

ii) the NA for the fiber

iii) acceptance angle in air for the fiber

Q2) Attempt any two of the following: **[16]**

a) What are the criterion used for selecting materials for optical fibers? Explain how the addition of these material changes the refractive index profile?

b) What are the different chemical vapor deposition process? With neat diagram explain vapor axial deposition process?

c) A multimode step index fiber with a core diameter of 80 μm and a relative index difference of 1.5% is operating at a wavelength of 0.85 μm . If the core refractive index is 1.48, estimate: (a) the normalized frequency for the fiber; (b) the number of guided modes.

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Q3) Attempt any two of the following: **[16]**

a) What are the factors responsible for causing absorption in optical fiber? Explain intrinsic & extrinsic absorption?

b) With the help of neat diagram Material, Waveguide & Polarization mode dispersion?

c) State different types of scattering losses in optical fiber? With the help of neat diagrams explain Rayleigh & Mie scattering?

Q4) Attempt any two of the following: **[18]**

a) Explain in details effect of temperature on linearity of optical sources? How it can be compensated?

b) The radiative and non-radiative recombination lifetimes of the minority carriers in the active region of a double-heterojunction LED are 60ns and 100ns respectively. Determine the total carrier recombination lifetime and the power internally generated with in the device when the peak emission wavelength is 0.87 μm at a drive current of 40 mA.

c) Compare LED & LASER.

Q5) Attempt any two of the following: **[16]**

a) Explain in detail Fundamental receiver operation?

b) Derive the expression for Probability of error in digital receiver?

c) A photodiode has a quantum efficiency of 65% when photons of energy 1.5×10^{-19} J are incident upon it.

i) At what wavelength is the photodiode operating?

ii) Calculate the incident optical power required to obtain a photocurrent of 2 .5 μA

Q6) Attempt any two of the following: **[16]**

a) Explain operating principles of WDM. Write different WDM standards?

b) Explain in detail Fiber Bragg grating & diffraction grating filters?

c) Explain in detail WDM+EDFA performance



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Total No. of Pages :2

Seat No.	

T.E. (Electronics & Telecommunication) (Semester - VI) (Revised) Examination, November - 2017

MICROPROCESSOR & MICROCONTROLLER

Sub. Code: 66918

Day and Date :Friday, 03 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) Attempt any two of the following. **[2×8=16]**

a) Draw and Explain Architecture of 8085.

b) Draw and Explain Machine Cycle of Instruction MVI A, 20H.

c) Draw and Explain Interrupt structure of 8085.

Q2) Attempt any two of the following: **[2×8=16]**

a) Draw and Explain Block Diagram of 8255.

b) Interface 8K×8 RAM to 8085 using 4K×8 RAM chip with starting address of memory 2000H, Explain Interfacing in detail with memory address.

c) Interface ADC 0809 to 8085 using 8255 and write a program to convert analog voltage to digital value which is connected to channel 5.

Q3) Attempt any two of the following: **[2×9=18]**

a) Draw and Explain Architecture Block diagram of 8051.

b) Explain different addressing modes of 8051 with one Example each.

c) Draw and Explain RAM and ROM Memory organization of 8051.

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Q4) Attempt any two of the following: **[2×8=16]**

a) Write an ALP for 8051, to transmit data serially at baud rate 4800. Assume that the data is stored at RAM location 30H and crystal frequency = 11.0592MHz.

b) Draw and explain block diagram of Mode 2 of timer 0 in 8051. Explain TMOD SFR in detail.

c) Write the Interrupts available in 8051 along with their vector addresses. Explain IE and IP register in detail.

Q5) Attempt any two of the following: **[2×9=18]**

a) Interface 16K ×8 RAM to 8051 using memory chips of 8K×8 capacity. Explain the interfacing in detail and also give the start and end addresses of RAM memory.

b) Draw the interfacing diagram of ADC 0808 to 8051. Write in detail the use of every pin of ADC 0808, used for interfacing.

c) Interface LM35 sensor and LCD to 8051. Write the detail algorithm/ flowchart to display the temperature on LCD.

Q6) Attempt any two of the following: **[2×8=16]**

a) Write the various data types available in embedded C along with their size. Also write an embedded C program for 8051 to generate any delay.

b) Write an embedded C program to generate a square wave of 1 KHz on pin P1.0 of 8051. Assume crystal frequency = 12 MHz.

c) Write an embedded C program to send out the value 44H serially one bit at a time via P1.0. The MSB should go out first.

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Seat No.	

T.E. (Electronics & Telecommunication) (Part-III) (Semester-VI) (Revised) Examination, November - 2017

VLSI DESIGN

Sub. Code : 66917

Day and Date : Thursday, 02-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All main questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Draw diagrams and Truth Tables wherever necessary.**

Q1) Attempt any three of the following: **[3×6=18]**

a) What is the need of HDL? Explain the capabilities of VHDL.

b) Write VHDL code for 1:4 De-multiplexer.

c) Write a short note on - Libraries in VHDL.

d) Explain the following VHDL statements with syntax and example

i) Process ii) With-Select

e) Write VHDL code for D Flip-flop with asynchronous reset.

Q2) Attempt any two of the following: **[2×8=16]**

a) Draw an explain VLSI Design Flow.

b) What is a package in VHDL? Write its syntax and explain with suitable example.

c) Write VHDL code for

i) Parity Generator ii) Parity Checker

Q3) Attempt any two of the following: **[2×8=16]**

a) What are the different forms of wait statement? Explain with example.

b) Design a Mealy machine for sequence detector to detect overlapping sequence 1010. Write VHDL code for the same.

c) Explain attributes in VHDL with example.

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Q4) Attempt any three of the following: **[3×6=18]**

a) Briefly explain about Data Types in Verilog with examples.

b) Write Verilog code for

i) Full Adder ii) Binary to Gray code converter

c) Draw physical structure of MOS Transistor (MOSFET). Explain the V-I characteristics of the same.

d) Write a Verilog code for 4 bit counter with Reset and Enable inputs.

Q5) Answer any two of the following: **[2×8=16]**

a) Derive the expression for Drain current I_D of MOSFET in

i) Linear/resistive region ii) Saturation region

b) Draw and explain in detail the product term allocator in a macrocell within Function Block of XC9500 series.

c) Draw and expalin in detail the basic block diagram of Spartan 3E family FPGA.

Q6) Attempt any two of the following: **[2×8=16]**

a) Explain the following methodologies for testing combinational circuits. Take an example for each.

i) Stuck-at-Fault Models ii) Path sensitization

b) With the help of typical boundary scan cell diagram and basic boundary scan architecture explain the concept of boundary scan testing.

c) Write a VHDL/Verilog code for 4-bit Ripple Carry Adder, using Full adder as component.

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Total No. of Pages : 3

Seat No.	

T.E. (Electronics & Telecommunication) (Semester - VI)
(Revised) Examination, November - 2017
DIGITAL SIGNAL PROCESSING
Sub. Code: 66916

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **All Questions are compulsory.**
2) **Figures to right indicates full marks.**
3) **Assume suitable data if required.**

Q1) Attempt any **Two:** **[18]**

a) Explain the concept of convergence of Fourier transform and Gibb's phenomenon.

b) What is DTFT. Explain symmetrical properties of DTFT.

c) What is twiddle factor? Compute the DFT of 4-point sequence, x(n) = (0, 1, 2, 3)

Q2) Attempt any **Two:** **[16]**

a) Find y(n) = x(n) *h(n) for sequence

x(n) = (1,2,-1,2,3,-2,-3,-1,1,1,1,2,-1) and h(n)=(1,2) using overlap add method.

b) Explain Goertzel FFT algorithm.

c) For x1(n), x2(n) given, compute Circular Convolution.

x1(n) = (2, 1, 2, 1), x2(n) = (1, 2, 3, 4)

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Q3) Attempt any Two: [16]

a) Describe frequency sampling method for FIR filter design.

b) Determine coefficients of linear phase FIR filter of length M=15 which has a symmetric unit sample response and a frequency response that satisfies the condition, use frequency sampling method.

$H_r(2\pi k/15) = 1 \quad k = 0,1,2,3$

$= 0.4 \quad k = 4$

$= 0 \quad k = 5, 6, 7$

c) Explain windowing technique used in FIR filter design. Give any two window functions.

Q4) Attempt any **Two:** **[18]**

a) For the analog transfer function H(s) = 1/ (s+1) (s+2), Determine H(z) using impulse invariant technique. Assume T = 1 sec.

b) Explain BLT method of IIR filter design.

c) Design digital low pass filter using Butterworth approximation to meet following specifications:

Pass band edge = 120 Hz

Stop band edge = 170 Hz

Stop band attenuation = 16 dB

Assume sampling frequency of 512 Hz.

Q5) Attempt any **Two:** **[16]**

a) Explain the cascade form realization of FIR filter.

b) State realizations of IIR filter. Explain any one in detail.

c) Explain Direct form realization of FIR filter and obtain Direct form realization of system function given:

$H(z) = 1+2\,z^{-1} - 3z^{-2} - 4z^{-3} + 5z^{-4}$

Q6) Attempt any **Two:** **[16]**

a) Compare microprocessor and DSP processor.

b) Explain different architectures of DSP's.

c) Explain specifications of any DSP processor.

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Seat No.	

Total No. of Pages : 2

T.E. (E&TC)(Electronics & Telecomm Engg.) (Part - III) (Semester - V) Examination, November - 2017

POWER ELECTRONICS (Revised)

Sub. Code : 66317

Day and Date : Monday, 20 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

SECTION - I

Q1) Solve any two [16]

a) Draw and explain characteristics & opration of power MOSFET.

b) Mention different tnrn-on method of scr. Explain PUT trissering circuit with waveforms.

c) Explain single phase half wave controlled relfifier with R-L load with waveforms.

Q2) Solve any two

a) Derive the expression for single phase full more controlled rectifier with R load for following.

i) Average output voltage

ii) Averange output corrent

iii) RMS output voltage

iv) RMS output corrent

b) State communication circuits for SCR and explain any two.

c) Draw and explain with circuit diagram, V-I characteristics of TRIAC.

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Q3) Write note on any three [18]

a) Ratings of power dovices

b) Reasonant turn off method.

c) SCR turn on methods

d) GTO

e) SCR protections

SECTION - II

Q4) Solve any two [16]

a) Explain 120° mode three phase inverter and compare 120° mode three phase inrester with 180° mode three phase invester

b) Explain with circuit diagram & woreform margnms chpper.

c) With the help of block schematic explain operation of UPS.

Q5) Solve any two [16]

a) What are the voltage control techniques of invester? Explain any one

b) Explain with circuit diagram speed control of D.C. series motor using chopper.

b) Draw the block schematic & explain PLC fundamentals.

Q6) Write note on any three

a) SCADA architecture & applications.

b) Dielectric heating

c) PWM tech fro harmonic redction in Invester.

d) Step-UP chopper

e) Zero voltage swith

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Seat No.	

Total No. of Pages : 2

T.E. (Electronics and Telecommunication Engineering) (Semester - V) Examination, November - 2017
LINEAR INTEGRATED CIRCUITS (Old)
Sub. Code : 45689

Day and Date : Monday, 27 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions: 1) **All questions are compulsory.**

2) **Figures to the right indicate full marks.**

SECTION - I

Q1) Attempt any two (8Marks Each) :

a) Draw and explain block diagram of opamp.

b) Draw non inverting amplifier circuit and derive the formula for voltage gain, I/P and O/P resistance, bandwidth, total O/P offset voltage.

c) List and explain the parameters of an opamp.

Q2) Attempt any two (8Marks Each) :

a) Draw and explain dual input, balanced output differential amplifier with DC analysis.

b) Discuss methods of frequency compensation used in opamp.

c) Explain Differential Amplifier using three Opamp.(Instrumentation Amplifier)

Q3) Attempt any three (6Marks Each) :

a) Ideal characteristics of OPAMP

b) Pinout of IC741

c) Schmitt Trigger

d) V-I converter

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SECTION - II

Q4) Attempt any two (8Marks Each)

a) Draw and Explain All pass filter.

b) Explain with diagram Wideband Band pass filter.

c) With neat waveform, explain triangular wave generator using comparator and integrator.

Q5) Attempt any two (8Marks Each) :

a) What is barkhausen criterion? Explain RC phase shift oscillator with diagram.

b) Draw functional diagram of IC 555 and explain.

c) Draw and explain square wave generation using opamp.

Q6) Attempt any three (6Marks Each)

a) Two applications of PLL

b) Hartley oscillator using opamp.

c) Notch filter.

d) IC 565.

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b) With an example explain the Huffman coding.

c) Apply the Shannon's Fano coding procedure for the following message ensemble

$[X] = [X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7]$ with respective probabilities.

[P] = [0.4 0.2 0.12 0.08 0.08 0.08 0.04]. Take M = 2. Determine code efficiency.

23) Solve any two: (8 marks each)

a) Explain in detail Uniform quantization.

b) Explain the DPCM with neat block diagram.

c) Draw and explain with block diagram linear delta modulation.

SECTION -II

24) Solve any two: **[2 × 8 = 16]**

a) Draw and explain scrambler & unscrambler implementation using shift register structure.

b) Draw and explain baseband PAM system.

c) Write a note on eye diagram.

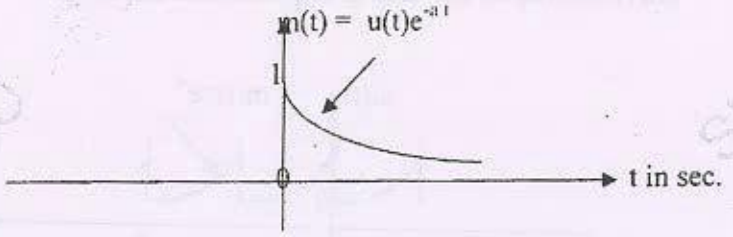
25) Solve any two: **[2 × 8 = 16]**

a) Explain QAM modulation with the help of constellation diagram.

b) Compare band pass modulation techniques.

c) Explain DS-SS technique.

b) Find continuous spectrum of a non periodic signal m(t) shown in fig.



c) Explain properties of Fourier Transform in detail.

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Q2) Solve any two : **[18]**

a) Explain basic elements of block diagram representation of CT-LTI system. Construct block diagram for following system

$$\frac{d^2y(t)}{dt^2}+2\frac{dy(t)}{dt}+3y(t)=4\frac{dx(t)}{dt}+5x(t)$$

b) Convolve the following sequences

$x(n) = u(n)$

$h(n) = a^n u(n)$ for $|a| < 1$

c) Convolve the two DT sequences given below, also sketch the result.

$x[n] = 1$ for $0 \le n \le 4$

$= 0$ Elsewhere

$Y[n] = (2)^n$ for $0 \le n \le 6$

$= 0$ Elsewhere

Q3) Solve any two : **[16]**

a) Write short note on sampling in frequency domain.

b) Explain effect of under sampling: Aliasing

c) State & explain properties of LTI system.

Q4) Solve any two : **[16]**

a) Find the ZT of finite duration sequence

i) $x[n] = \cos(nwT)u[n]$

ii) Find the ZT and sketch ROC of following sequence

$x[n] = (2)^n u[n] + (3)^n u[-n-1]$

b) Determine the DT sequence associated with Z-Transform given below using "Power Series Method".

$X[z] = (z^2+z)/(z^3-3z^2+3z-1)$; $z > 1$ R.O.C.

OR

b) Determine the DT sequence associated with Z-Transform given below using "P.F.E" method. $X[Z] = (4Z^2-2Z)/(Z^3-5Z^2+8Z-4)$.

c) Explain properties of Z-transform in detail.

c) What is the maximum power received at a distance of 0.5 km over a free-space 1 GHz circuit consisting of a transmitting antenna with a 25 dB gain and a receiving antenna with a 20 dB gain? The gain is with respect to a lossless isotropic source. The transmitting antenna input is 150 W.

Q3) Write notes on any three of the following. **[18]**

a) Design procedure of circular microstrip antenna for the dominant TM_{110} mode.

b) Shape - impedance considerations.

c) Antenna ranges

d) Field from oscillating dipole.

SECTION - II

Q4) Solve any two of the following : **[16]**

a) Describe briefly the two different types of phased array radars and compare their relative merits.

b) A sky - wave is incident on D - layer at an angle of 30°. Find the angle of reflection if the frequency of the transmitted wave is 50 MHZ.

c) When the maximum electron density of the ionospheric layer corresponds to refractive index of 0.92 at the frequency of 10 MHz. find the range if the frequency is MUF itself. The height of the ray reflection point on the ionoshperic layer is 400 km. Assume flat earth and negligible effect of earth's magnetic field.

Q5) Solve any two of the following: **[16]**

a) Explain regular and irregular variations of ionosphere.

b) Explain the block diagram of the operation of an MTI radar system using power amplifier in transmitter.

c) Calculate the maximum range of a radar system which operates at 3 cm with a peak pulse power of 500 kW, if its minimum receivable power is 10^{-13} W, the capture area of its antenna is $5m^2$, and the radar cross-sectional area of the target is 20 m^2.

c) For the system $\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1 - 6s + 16}$

Find i) Rise time ii) Peak time

iii) Settling time

iv) Peak overshoot (Mp)%

13) Solve any two [2 × 8 = 16]

a) State and explain Hurwitz and Routh criteria

b) $\frac{C(s)}{R(s)} = \frac{K}{s^4 + 6s^3 + 30s^2 + 60s + K}$ Find 'K' for stable system.

c) Find stability :

i) $s^4 + 2s^3 + 8s^2 + 4s + 3 = 0$

ii) $3s^4 + 10s^3 + 5s^2 + 5s + 2 = 0$

SECTION - II

14) Solve any two [2 × 9 = 18]

a) Explain the procedure for constructing the bode plot from system function.

b) Sketch bode plot and determine gain crossover and phase crossover frequencies.

$$G(s) = \frac{10(s^2 + 21s + 20)}{(s+2)(s+10)(s+1)^2}$$

c) Draw Nyquist plot and comment on stability of unity feedback system

6) Attempt any two from the following :

a) Compare CPM & PERT. State its applications. [8]

b) The following table gives the activity time of a certain project together with immediate predecessor requirements. [8]

Activity	Immediate predecessor	Time in days
A	-	6
B	-	8
C	A	4
D	B	6
E	A,B	10
F	C,D	6
G	E	8
H	F,G	4

i) Draw the network

ii) Determine the expected project completed time

iii) Find critical path?

c) A project consists of seven activities. Table below gives the estimates of the optimistic, most likely and pessimistic duration in weeks of each activity. [8]

Activity	Expected Duration in Days		
i-j	Optimistic	Most likely	Pessimistic
1-2	2	2	14
1-3	2	8	14
1-4	4	4	16
2-5	2	2	2
3-5	4	10	28
4-6	4	10	16
5-6	6	12	30

i) Draw project network

ii) Compute the expected time and variance of each activity.

iii) Determine expected project duration and its variance.

Total No. of Pages : 4

Seat No.

T.E. (ETC) (Part - II) (Semester - VI) (Revised)

Examination, November - 2017

INDUSTRIAL MANAGEMENT

Sub. Code : 66920

)ay and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

nstructions:
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**
4) **Use of non-programmable scientific calculator is allowed.**

SECTION - I

21) Solve any two of the following :

a) State principles of organization. Distinguish formal organization and Informal organization. [8]

b) What is importance of Staffing? Explain the commonly used staffing procedure for any company. [8]

c) What is the motivation? Explain McGregor's Theory X & Theory Y. [8]

22) Solve any two of the following :

a) What is marketing strategy? Explain the importance of 4 P's in marketing of Mobile Handset. [8]

b) What are the steps involved in starting the Small Scale Industry (SSI). [8]

c) Explain importance of Inventory Control and Cost Associated with Inventory. [8]

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3) Write short notes on any three of the following :

a) Marketing and Selling Concept. [6]

b) EOQ and ABC analysis. [6]

c) Forms of Business Organization. [6]

d) Functions of Material Management. [6]

e) Management and Social Responsibility. [6]

SECTION - II

4) Attempt any three from the following :

a) Define operations research and Explain steps involved in solving problems in operations research. [6]

b) Use Graphical Method to solve the following LPP [6]

$$\text{Minimize } Z = 4x_1 + 2x_2$$

subjected to constraints,

$$3x_1 + x_2 \geq 27,$$
$$x_1 + x_2 \geq 21$$
$$x_1 + 2x_2 \geq 30$$
$$x_1, x_2 \geq 0$$

c) An agriculturist has a farm with 126 acres. He produces radish, pea and potato. Whatever he raises is fully sold in the market. He gets Rs. 15 for radish per kg, Rs. 10 for pea per kg and Rs. 25 for potato per kg. The average yield is 1,500 kg of radish per acre, 1,800 kg of pea per acre and 1,200 kg of potato per acre. To produce each 100 kg of radish and pea and to produce each 80 kg of potato, a sum of Rs. 12.50 has to be used for manure. Labour required for each acre to raise the crop is 6-man-days for radish and potato each and 5-man-days for pea. A total of 500 man-days of labour at a rate of Rs. 40 per man-day are available. Formulate this problem as an LP model to maximize the agriculturist's total profit. [6]

d) Use simplex method to solve the following : [6]

$$\text{Maximize } Z = 3x_1 + 2x_2$$

subjected to constraints,

$$2x_1 + x_2 \leq 60,$$
$$x_1 + x_2 \leq 18$$
$$3x_1 + x_2 \leq 44$$
$$x_1, x_2 \geq 0$$

5) Attempt any two from the following :

a) Explain the following :

i) Unbalanced assignment problem [4]

ii) Unbalanced Transportation problem [4]

b) Five tasks are to be assigned to five engineers. Cost of the assignment of a task to each engineer is given in the table below. Determine optimum assignment to minimize total cost. [8]

Engineers	Tasks				
	I	II	III	IV	V
A	60	30	75	90	100
B	35	20	30	60	75
C	40	10	55	70	85
D	50	40	80	80	75
E	55	35	70	90	85

c) A Company has to work out a minimum cost transportation schedule to distribute their product from three of its factories X, Y, and Z to its five warehouses A, B, C, D and E. The required particulars are given below. Find IBFS using [8]

i) Northwest corner method

ii) Least cost method

From	Transportation cost in Rs Per unit To					Supply
	A	B	C	D	E	
X	10	15	17	19	16	**90**
Y	20	12	16	18	20	**50**
Z	9	14	21	10	18	**60**
Demand	**30**	**40**	**50**	**20**	**60**	

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Total No. of Pages : 3

Seat No.	

S.E. (ETC) (Semester - III) Examination, November - 2017

ENGINEERING MATHEMATICS -III

Sub. Code : 63460

Day and Date :Friday, 10 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Use of non-programmable calculator is allowed.

SECTION - I

Q1) Attempt any three of the following.

a) Solve: $(D^3 - 2D^2 - 5D + 6)y = \cosh 2x$. **[6]**

b) Solve: $\frac{d^2y}{dx^2} + 4y = \sin 3x + x^2$. **[6]**

c) Solve: $(1+x)^2 \frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = 4\cos\{\log(1+x)\}$ **[6]**

d) A condenser of capacity C is discharged through the inductance L and a resistance R in series and the charge q at any time t satisfies the equation

$$L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{C} = 0.$$

Given that L = 0.25 henry, R = 250 ohms, C = 2×10^{-6} farads. When t = 0, the charge q is 0.002 coulombs and the current $\frac{dq}{dt} = 0$. Obtain the value of q in terms of t. **[6]**

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22) Attempt any two of the following:

a) Obtain the Fourier series to represent f(x) given as follows: **[8]**

$$f(x)=\begin{cases}1+\dfrac{2x}{\pi}, & for\ -\pi\le x<0,\\ 1-\dfrac{2x}{\pi}, & for\ 0<x\le\pi.\end{cases}$$

Hence show that $\dfrac{\pi^2}{8}=\dfrac{1}{1^2}+\dfrac{1}{3^2}+\dfrac{1}{5^2}+\ldots$

b) Find the Fourier series for $f(x)=\pi e^{kx}$ in the interval $(0, 2\pi)$. **[8]**

c) Find the half range sine series of **[8]**

$$f(x)=\begin{cases}1, & for\ 0\le x\le 1,\\ x, & for\ 1\le x\le 2.\end{cases}$$

23) Attempt any two of the following:

a) Find the Fourier transform of f(x) defined by **[8]**

$$f(x)=\begin{cases}1, & |x|<a,\\ 0, & |x|>a.\end{cases}$$

and hence evaluate $\int_{-\infty}^{\infty}\dfrac{\sin sa\cos sx}{s}ds$

b) Find the Fourier sine transform of e^{-x}, $x\ge 0$ and hence deduce that

$\int_0^{\infty}\dfrac{x\sin mx}{1+x^2}dx=\dfrac{\pi}{2}e^{-m}$ (Where $m>0$). **[8]**

c) Find $f(x)$ satisfying following integral equation

$$\int_0^{\infty}f(x)\sin sx\,dx=\begin{cases}1, & 0\le s\le 1\\ 2, & 1\le s\le 2\\ 0, & s\ge 2\end{cases}$$

by using inverse Fourier sine transform **[8]**

SECTION - II

24) Attempt any "Three" of the following

a) Find L $\{t^2.\sin^2(2t)\}$ **[6]**

b) If the function $f(t)=1\ ;\ 0<t<9$ **[6]**

$=-1;\ a<t<2a$

and $f(t)=f(t+2a)$ then find L $\{f(t)\}$.

c) Find $L^{-1}\left[\dfrac{2s^2-4}{(s+1)(s-2)(s-3)}\right]$ **[6]**

d) Solve using laplace transform method **[6]**

$(D^3+2D^2-D-2)y=0$, with $y(0)=1$, $y'(0)=2$ and $y''(0)=2$.

25) Attempt any "Two" of the following.

a) find the constants a, b, c if the normal to the surface $ax^2+yz+bxz^3=c$ at (1, 2, 1) is parellel to the normal to the surface $y^2+xz=61$ at (10,1,6). **[8]**

b) A vector field $\vec{f}=(ysinz-sinx)i+(xsinz+2yz)j+(xycosz+y^2)k$ prove that $\vec{f}$ is irrotational and hence find its scalar potential. **[8]**

c) If $\vec{f}=\left(\dfrac{x}{r}i+\dfrac{y}{r}j+\dfrac{z}{r}k\right)$ where $\vec{r}=xi+yj+zk$ then prove that divergence of $\vec{f}$ is a function of r and also $\vec{f}$ is irrotational vector field. **[8]**

26) Attempt any "two" of the following.

a) Find the z-transform of $x_k=\left(\dfrac{3^k}{k}\right)$; $k\ge 1$. **[8]**

b) Find the inverse z-transform of $\left(\dfrac{z}{z^2+7z+10}\right)$. **[8]**

c) Find the z-transform of cos(ak) if $k\ge 0$. **[8]**

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Total No. of Pages : 3

Seat No.	

S.E. (E & TC) (Semester - IV) Examination, November - 2017

ANALOG CIRCUITS - II

Sub. Code: 63466

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non programmable calculator is allowed.**
4) **Use of standard data sheet is allowed.**
5) **Assume suitable data if necessary and highlight it.**

Q1) Attempt any three questions. **[18]**

a) Derive the parameter equations such as Ri,Ro,Av and Ai for multistage RC coupled amplifier.

b) Explain crossover distortion. What it is caused by, and how it is overcome?

c) What is harmonic distortion? Explain three-point method of calculating harmonic distortion of power amplifier.

d) What is feedback? With the help of expressions explain advantages of negative feedback.

Q2) Attempt any two questions. **[16]**

a) Design a two stage direct coupled amplifier for $R_L = 10\,k\Omega$, $V_{CC} = 15$ V, $R_S = 300\ \Omega$ and frequency of operation = 5 Hz. Provide per stage gain greater than 8.

b) Design class B push pull amplifier for following specifications:

$P_o = 500$ mW, Loud speaker impedance = 4Ω, $V_{CC} = 12$V.

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c) Design current series negative amplifier for following specifications: V_{CC} = 12 V, A_V = 20, S = 10, use transistor BC147A, h_{ie} = 2.7 kΩ, h_{fe} = 220.

Q3) Attempt any two questions. **[16]**

a) Design a two stage voltage series feedback amplifier with overall gain of 200 and lower 3dB frequency not more than 10 Hz. The output should be of 10V(p-p), Consider R_S = 300Ω.

b) Design complimentary symmetry power amplifier to deliver a power of 1 w to a load of 8Ω. The lower 3dB cut-off frequency is 50 Hz.

c) Derive the parameter equations such as Rif, Rof, Avf and Aif for voltage series negative feedback.

Q4) Solve any Two: **[16]**

a) With neat circuit diagram of Hartley oscillator, derive the equation of frequency of oscillations.

b) With the help of block schematic explain the operation of IC LM3524.

c) Design RC phase oscillator for Frequency of oscillations is 5kHz, $I_{C(sat)}$=5mA, h_{fe}=50, h_{ie} = 4.5kΩ, S ≤ 10.

Q5) Solve any Two: **[16]**

a) With neat circuit diagram and waveforms explain operation of astable multivibrator.

b) Design Schmitt trigger circuit for the given data UTP=4V, LTP=2.5V, V_{CC}=10V, $I_{C(sat)}$=10mA, $V_{BE\ (sat)}$=-0.7V, $V_{BE(off)}$=-0.5V, $h_{fe(min)}$=100, Recovery time constant=1μs and OF=3

c) Design a monostable multivibrator to meet following specifications: Output pulse width=1 ms, V_{CC}=10V, V_{BB}=-5V, $V_{BE(sat)}$=0.6V, $V_{CE(sat)}$=0.3V. Use transistor data $h_{fe(min)}$=200, $I_{C(max)}$=0.1A, $V_{CE(max)}$=45V, $P_{D(max)}$=0.5W.

Q6) Write note on any Three **[18]**

a) Wien Bridge oscillator.

b) Transistor as switch.

c) Voltage regulator 78XX and 79XX.

d) Triggering methods in multivibrators.

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Total No. of Pages : 2

S.E. (Electronics and Telecommunication) (Part-II) (Semester-IV) (New) Examination, November - 2017

DATA STRUCTURE

Sub. Code : 63468

Day and Date : Friday, 03-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION-I

Q1) Solve any TWO from THREE: **[18]**

a) What is linear array? Write an algorithm for insertion of element in to a linear array and explain in brief.

b) What is linked list? Explain different types of linked list.

c) What is Data Structure? Discuss briefly different types of data structure.

Q2) Solve any TWO from THREE: **[16]**

a) What is stack? Write algorithm for push operation to save item on stack and explain it in brief.

b) What is Linear search? Write algorithm for linear search in case of an array and explain its time complexity.

c) Write algorithm for deletion from linked list and explain it in brief.

Q3) Solve any TWO from THREE: **[16]**

a) Define queue. Explain the different types of queues.

b) Explain term Garbage collection? Also explain overflow & underflow situations.

c) What is time space trade off? Explain with example.

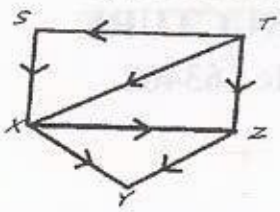
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SECTION-II

Q4) Solve any THREE: **[18]**

a) Consider graph G in the figure below, Suppose the nodes are stored in an array in a memory as follows X, Y, Z, S, T then



i) Find the adjacency matrix A of G.

ii) Find the path matrix P of G.

iii) Is G strongly connected?

b) Construct a binary tree from the given order:

Preorder: ABDEFCGHJLK

Inorder: DBFEAGCLJHK

c) Explain linked representation of graph.

d) Write short note on directed graph.

Q5) Solve any TWO from THREE: **[16]**

a) Explain construction of a heap tree. Write algorithm for insertions into the heap tree.

b) Define AVL tree. Explain the insertions into AVL with different rotations.

c) Explain Warshall's algorithm with suitable example.

Q6) Solve any TWO from THREE: **[16]**

a) What is hashing. Explain different hash functions.

b) Explain insertion in m-way search tree with proper example.

c) Write an algorithm for inserting an edge in a graph.



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Total No. of Pages : 2

Seat No.	

S.E. (Electronics and Telecommunication)(Part-II) (Semester-IV) Examination, November-2017

Electromagnetic Engineering

Sub. Code : 63469

Day and Date : Monday, 06 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1) **Attempt any three questions from each section**

2) **Figures to right indicates full marks**

Section - I

Q1) Solve any TWO from THREE **[16]**

a) Transform the vector $4\bar{a}_x - 2\bar{a}_y - 4\bar{a}_z$ to spherical co-ordinates at the point P(-2,-3 ,4).

b) State and prove divergence theorem.

c) Derive the expression electric field intensity at a point due to infinite sheet charge with Q_s^{c/m^2} charge density in XY plane.

Q2) Solve any TWO from THREE **[16]**

a) Explain the applications of GAUSS'S law.

b) Derive the expression for energy density in electrostatic field.

c) Five identical 15 μc point charges are located at the centre & corners of a square defined by -1<x, y<l, z=0.

i) Find force on 10 μc pt.charge at (0,0,2).

ii) Calculate the electric field intensity at (0,0,2).

Q3) Solve any THREE from FOUR **[18]**

a) Write a note on electric scalar potential.

b) State and explain divergence theorem.

c) Find the force due to two point charges Q1=4mC and Q2=2mC located at A(3,2,-l) and B(-1,-l,4)on a charge Q3=20nC located at C(0,3,l).

d) Show that for dielectric slab placed in capacitor $\frac{P}{E} = \varepsilon - \varepsilon_0$

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Section - II

Q4) Solve any two [16]

a) Derive an expression for magnetic field intensity due to infinite long straight fillament.

b) State and explain ampere's circutal law.

c) Consider $\mu_1 = 5\mu H/m$ in the region where Z > 0 and $\mu_2 = 8\mu H/m$ in the another region where Z < 0. For the region where Z > 0, the magnetic flux density is given as $\bar{B}_1 = 2\bar{a}_x - 3\bar{a}_y(mT)$, $\bar{K} = 80\ \bar{a}_x$ A/m. on the surface Z = 0. Find the value of $\bar{B}_2$ for the region where Z < 0.

Q5) Solve any two [16]

a) Derive maxwell equations for static field.

b) Derive and explain wave equation for electric and magnetic field for lossless media.

c) Find $\bar{H}$ and β if the electric field intensity is given as $\bar{E} = 0.1\sin(10\pi x)\cos(6\pi \times 10^9 t - \beta z)\bar{a}_y(v/m)$ in air.

Q6) Solve any two [18]

a) Derive an input impedance equation for transmission line having length x terminating with impedance Z_L

b) A 50W lossless line has a length of 0.4λ . The operating frequency is 300MHz. A load $Z_L = 40 + j30\Omega$ is connected at z = 0 and the thevenin's equivalent. Source at $Z = -\ell$ is $12\angle 0^\circ$ V in series with thevenin impendance $Z_{th} = 50 + j0\Omega$. Find reflection coefficient, VSWR and Z_{in}

c) A load $Z_L = 80 - j100\Omega$ is located at Z = 0 on a lossless 50Ω line. The operating frequency is 200MHz and wavelength on the line is 2m. If the line is 0.8m in length, using smith chart find input impedance. What is VSWR.



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Total No. of Pages : 2

Seat No.	

S.E. (ETC) (Semester - III) (Revised) Examination, November - 2017

TRANSDUCERS & MEASUREMENTS

Sub. Code : 63464

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1)All questions are compulsory.

2)Figures to the right indicate full marks.

SECTION - I

Q1) Attempt any two **[16]**

a) Explain thermocouple with the help of neat diagram.

b) With block schematic explain the introduction to procen instrumentation.

c) Explain the operation of R-2R ladder type DAC.

Q2) Attcmpt any two. **[16]**

a) Explain the first order HPF and derive the expression for the transfer function.

b) What is function of demodulator. Explain any one in detail.

c) Explain DC Singal conditioning system in detail.

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Q3) Write short notes on (Any three). [18]

a) Analog and Digital instruments

b) Basic grounding methods

c) Light dependent resistor

d) Hall effect transducer

SECTION - II

Q4) Answer any two [16]

a) Explain static and Dynamic Characteristics of an Instrument.

b) With neat block diagram explain working of successive approximation type digital voltmeter.

c) Explain in detail Dual trace oscilloscope.

Q5) Answer any two [16]

a) Derive expression for Hay's Bridge.

b) Explain frequency and phase measurement using lissajous pattern.

c) Schering bridge consists of following components at balance of bridge.
Arm pq = 1kΩ resistor parallel with 0.5uf capacitor.
Arm Ps = 2.2KΩ non inductive resistance
Arm qr = standard quality mica capacitor of 0.01 μf.
Arm rs = unknown arm.
Find series equivalent of unknown arm & Dissipation factor. Given frequency = 2KHz

Q6) Write short notes on (Any three). [18]

a) LCD display

b) Wheatstone's bridge

c) Dual beam CRO

d) Digital measurement of time

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Total No. of Pages : 2

S. E. (Electronics and Telecom.) (Part - II) (Semester - III) Examination, November - 2017

ANALOG CIRCUITS - I

Sub. Code : 63461

Day and Date : Monday, 13- 11 - 2017

Time : 10.00a.m. to 01.00 p.m. **Total Marks : 100**

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Use of non programmable calculator is allowed.

4) Use of standard data sheet is allowed.

5) Assume suitable data if necessary and highlight it.

Q1) Solve any Two **[16]**

a) What is clamper circuit? Explain various clamper circuits with different waveforms.

b) For input square wave draw different waveforms of high pass RC circuit for different conditions T = RC, T << RC, T >> RC

c) With neat circuit diagram explain voltage quadrapler.

Q2) Solve any Two **[16]**

a) With neat circuit diagram and waveforms explain operation of full wave rectifier without and with inductive filter.

b) Design regulated power supply for output dc voltage of 15V and output current of 80 mA with r = 1% use CLC filter.

c) Derive an expression for FWR for following parameters

i) Vdc ii) Vrms

iii) r iv) η

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Q3) Solve any two [18]

a) Design series pass regulator for input voltage of 15 to 35V, V_o = 12V, I_o = 90 mA find Sv.

b) Design transistor shunt regulator for following specifications V_{in} = 10 to 30 V, I_o = 100 mA, V_o = 6V.

c) Explain with design steps working of Zener shunt regulator.

Q4) Solve any two [16]

a) Draw and explain hybrid equivalent circuit for CB configuration of transistor.

b) Derive general expression for

i) Input Impedance

ii) Voltage gain, output impedance and current gain in terms of h parameters and the load.

c) Derive expression for lower 3 dB frequency due to Cc. Calculate size of Cc to provide 3 dB point of 100Hz when Rc = 1kΩ, hfe = 50, hie = 1kΩ, Rs = 600Ω, R1II R2 = 1kΩ.

Q5) Solve any two [16]

a) Derive expression for higher 3 dB frequency of CE amplifier. Calculate the value of higher 3 dB frequency if RL = 2KΩ, $C_{b'e}$ = 27 pf, $C_{b'c}$ = 4pf, $r_{b'c}$ = 860Ω, gm = 58×10^{-3} mho.

b) Derive the expression for lower cutoff frequency in term of sag of R.C coupled amplifier considering square wave.

c) Design single stage RC coupled CE amplifier for given data Vcc = 9V, S = 10, Av =90, f = 20Hz to 20kHz, Transistor Data : hfe = 220 hie = 2.7kΩ.

Q6) Solve any three [18]

a) Explain with diagram working of Enhancement type MOSFET.

b) Explain with diagram self bais for JFET.

c) High frequency response to square wave.

d) For silicon transistor hfe = 50, h_{ie} = 1KΩ f_T = 300MHz, $C_{b'c}$ = 4pf, Ic = 1.5 mA , T = 22°C. Calculate i) gm ii) $r_{b'e}$ iii) $r_{bb'}$.

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Total No. of Pages : 2

Seat No.	

S.E. (Electronics and Telecommunication) (Part - I) (Semester - III) Examination, November - 2017

DIGITAL ELECTRONICS

Sub. Code : 63462

Day and Date : Wednesday, 15 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions : **1** **All questions are compulsory**

2) **Figures to the right indicate full marks.**

Q1) Solve any two of the following. **[16]**

a) Explain following characteristics of digital IC'S.

i) Figure of merit

ii) fanin

iii) fanout

iv) noise immunity

b) Design and implement full adder.

c) Obtain set of prime implicants for following boolean expression

$f = \Sigma m (0,1,6,7,8,9,13,14,15)$

using quine - Mc cluskey method.

Q2) Solve any two of the following **[16]**

a) Design and implement 4-bit binary subtractor using IC 7483

b) Simplify using k-map

$Y = \Sigma m(1,3,5,9,11,13)$

c) Differentiate between TTL and CMOS logic families

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Q3) Write short notes on (any 3) [18]

a) Universal gates

b) CMOS inverter

c) Design 16:1 mux using 4:1 mux.

d) Mean terms and max terms

Q4) Solve any two of the following [16]

a) Design and implement mode - 5 asynchronous up counter.

b) Explain Johnson counter.

c) Explain finite - state model.

Q5) Solve any two of the following [16]

a) Convert SR flip flop to JK

b) Explain mealy machine and moore machine in detail.

c) Explain different types of memory devices in detail.

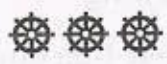
Q6) Write short notes (any 3) [18]

a) Timing parameters of flip flops.

b) State diagram.

c) Sequence detector.

d) Priority resolver.



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Total No. of Pages : 2

Seat No.	

S.E. (E & TC) (New) (Semester - IV) Examination, November - 2017

ANALOG COMMUNICATION SYSTEMS

Sub. Code : 63470

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 01.00 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to the right indicates full marks.**

Q1) Solve any three **[3 × 6]**

a) With a neat block diagram explain elements Communication System

b) Describe Low level AM modulation.

c) For an AM envelope with + V_{max} = 20 V and + V_{min} = 4 V, Determine,

i) Peak amplitude of the carrier,

ii) Modulation index,

iii) Peak amplitude of USB and LSB.

d) Describe operation of phase shift methods of SSB.

Q2) Solve any two **[2 × 8]**

a) Explain concept of Angle modulation with respect to FM.

b) Compare AM with FM

c) Describe with block diagram Indirect method of FM generation.

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Q3) Solve any two [2 × 8]

a) With respect to receiver define Selectivity, Sensitivity, Fidelity, Dynamic range.

b) Describe with neat diagram Superheterodyne receiver.

c) Explain effect of negative peak clipping and diagonal clipping.

Q4) Solve any two [2 × 8]

a) Write a note on Double conversion FM receivers.

b) Describe with neat diagram Foster-Seeley discriminator

c) Explain with block diagram double conversion FM receiver

Q5) Solve any two [2 × 8]

a) Explain Noise Figure and FRISS formula for Noise Figure.

b) Explain Internal and External noise in communication system.

c) Describe Burst noise and Thermal noise.

Q6) Solve any three [3 × 6]

a) Explain with neat block diagram PWM modulator and demodulator.

b) Compare PPM with PWM

c) Explain effect of allising error in sampling

d) Explain with neat block diagram Pulse Code Modulation System.



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Total No. of Pages : 4

Seat No.	

S.E. (Electronics & Telecommunication Engineering) (Semester - III) Examination, November - 2017

NETWORK ANALYSIS

Sub. Code : 63463

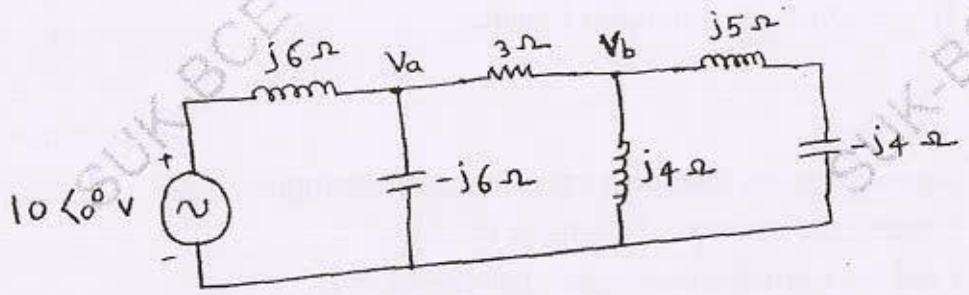
Day and Date : Tuesday, 21- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m to 01.00 p.m.

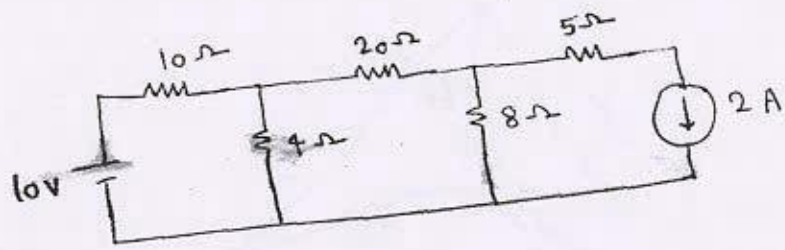
Instructions :
1) Q. No 4. from section - I & Q. No. 8 from section - II is compulsory & solve any two questions from remaining three questions of each section.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary.

SECTION - I

Q1) a) In the network shown in following figure determine V_a & V_b. **[8]**



b) Find the current through the 20 Ω resistor using Nortons theorem. **[8]**

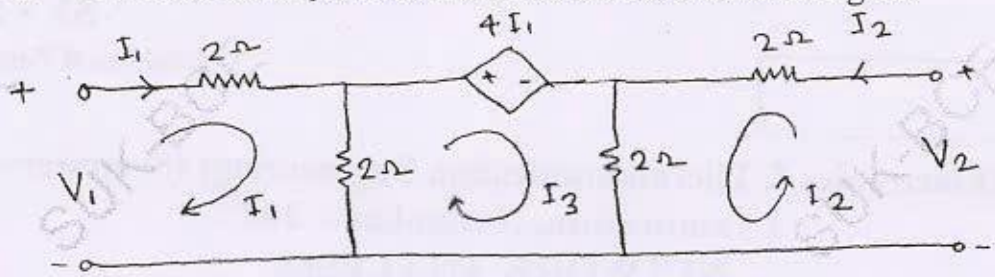


Q2) a) Determine ABCD parameters in terms of z - parameters. **[8]**

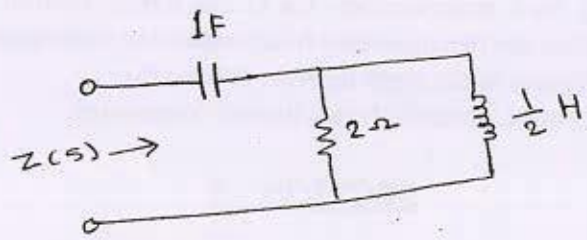
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b) Determine the z-parameters for the network shown in figure. [8]



Q3) a) Determine z (s) in the network shown in figure. Find out poles & zeros of z (s) & plot them on s - plane. [8]



b) i) Explain tree & co-tree with suitable example. [4]

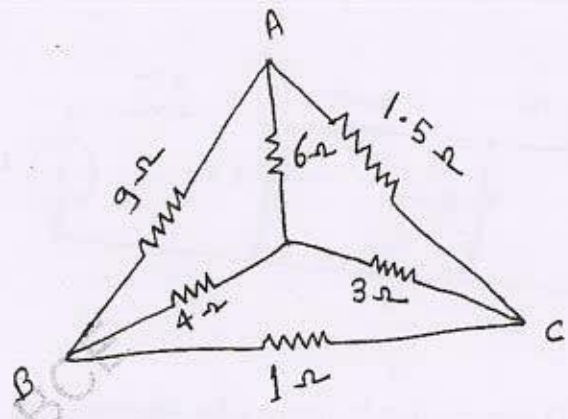
ii) Explain the principle of duality. [4]

Q4) Solve any three. [3 × 6 = 18]

a) State & explain Thevenin's theorem with example.

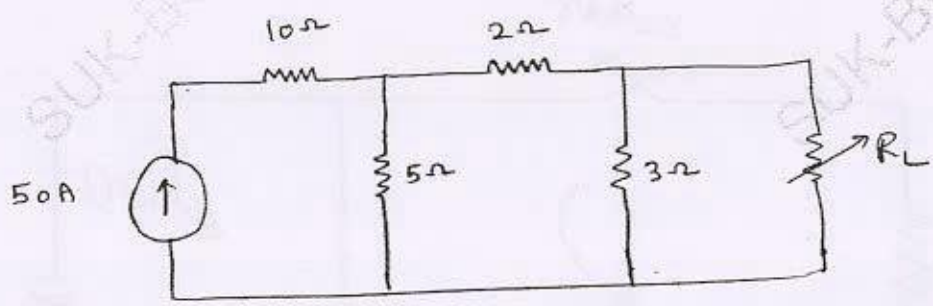
b) Explain the concept of complex frequency.

c) Find the equivalent resistance between A & B.



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d) For the circuit shown, find the value of the resistance R_L for maximum power & calculate the maximum power.



SECTION - II

Q5) a) What is the series resonance phenomenon? What are properties of series resonance? Draw and explain reactance curves. **[8]**

b) A series circuit with R = 10 Ω, L = 0.1H, C= 50μF has an applied voltage V = 50 ∠0° with a variable frequency. Find the resonant frequency, the value of frequency at which maximum voltage occurs across the inductor and the value of frequency at which maximum voltage occurs across the capacitor. **[8]**

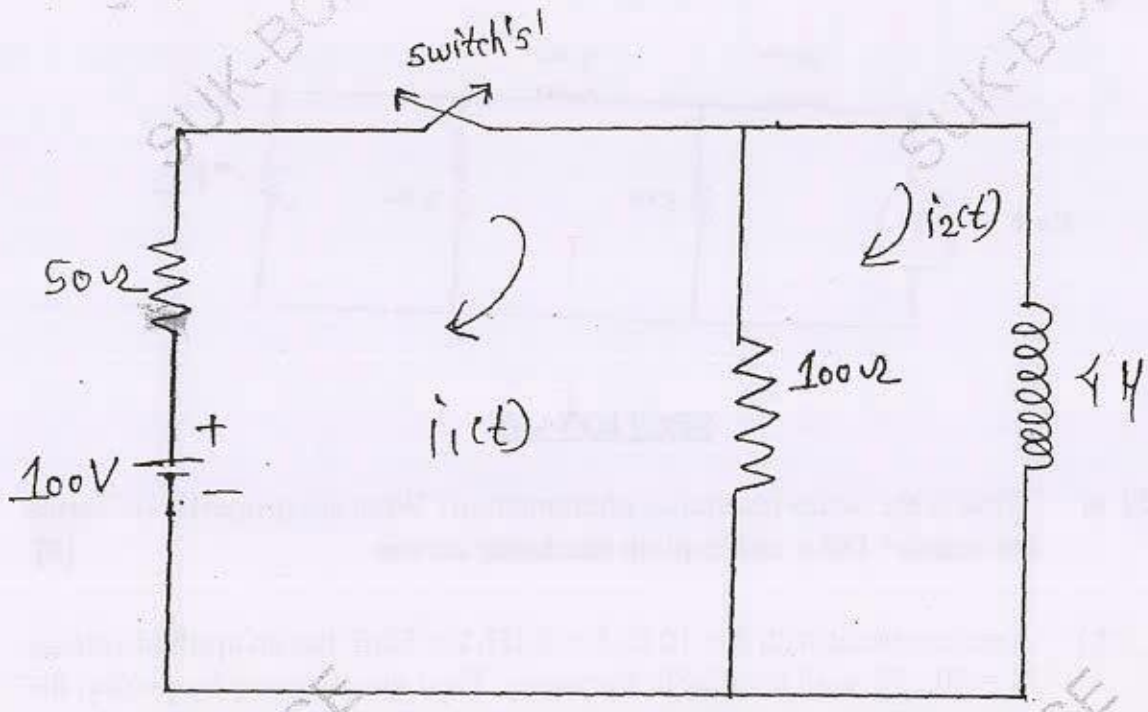
Q6) a) Show that the characteristic impedance of a symmetrical π-network is, **[8]**

$$Zo\pi = \sqrt{\frac{Z_1 Z_2}{1+\frac{Z_1}{4Z_2}}}$$

b) Design k - type Band pass filter having a design impedance of 500Ω and cutoff frequencies 1 KHZ and 10 KHZ. **[8]**

Q7) a) Explain with circuit diagram, sinusoidal response of R-L series circuit. **[8]**

b) Find the expression for current in the coil when the switch is closed at t=0 [8]



Q8) Solve any three.

a) Explain quality factor (Q) in resonance. [6]

b) Derive the expression for resonant frequeny for a Tank circuit.. [6]

c) Design a m-derived High pass filter with a cutoff frequency of 10 KHZ, design impedance of 200Ω and m = 0.4. (Design only T - section) [6]

d) Explain with circuit diagram, DC response of RLC series circuit. [6]

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Total No. of Pages :3

Seat No.	

T.E. (Mechanical) (Part-III) (Semester - VI) (Revised) Examination, November - 2017

METROLOGY AND QUALITY CONTROL

Sub. Code :66839

Day and Date : Friday , 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume any data if necessary and state it clearly**

Q1) Solve any two of the following **[18]**

a) What is the limit gauges. Explain the 'Taylor's principle for design of 'limit gauges'

b) Explain the following terms with neat sketch.

i) Unilateral tolerance

ii) Bilateral tolerance

iii) Upper deviation

iv) Lower deviation

c) Calculate the limits of the following 25 H7 d8 designated fit, identify it and draw it graphically, the standard tolerance is given by

$i = 0.45D^{\frac{1}{3}} + 0.001D$

i) 25 lies between steps of 18-30mm

ii) Fundamental deviation of d shaft=$-16D^{0.44}$

iii) for grade IT7 tolerance = 16i and for IT8 tolerance=25i

iv) Fundamental deviation of H-hole=0

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Q2 Solve any two of the following [16]

a) Compare mechanical comparator with optical comparator with the help of neat sketches.

b) Explain the use of sine bar for measuring an angle with the help of neat sketch and state its limitations.

c) Explain construction, working and limitations of sigma comparator.

Q3) Solve any two of the following [16]

a) Define straightness and flatness. Briefly explain how straightness and flatness is measured and specified.

b) Explain principle and working of Tomlinson's surface meter with neat sketch.

c) Define surface texture, Lay and explain ten point average method for surface finish measurement.

Q4) Solve any two of the following [16]

a) Define major diameter, effective diameter and enumerate various errors in screw thread.

b) Derive an expression for effective diameter measurement by 2-Wire method for external threads.

c) Describe the gear tooth vernier caliper and explain its use for checking tooth thickness.

Q5) Solve any two of the following [16]

a) Differentiate between quality control and quality assurance.

b) What is cost of quality? Explain cost of failure, cost of appraisal and cost of prevention.

c) Discuss the factors that control, quality of design and quality of conformance.

Q6) Solve any two of the following [18]

a) State the advantages, applications of control charts and sketch different patterns of control charts

b) Discuss following acceptance sampling terms

i) Average out going quality

ii) Average out going quality level

iii) Accepted quality level

c) A machine is working to a specification 80.75± 0.1mm a study of 32 consecutive pieces shows the following measurements. Construct the $\overline{X}$ and R chart and calculate process capability (For sample size of 8 take A_2 =0.37, D_4 =1.86, D_3 =0.14,d_2=2.847)

1st day	2nd day	3rd day	4th day
80.74	80.76	80.77	80.73
80.73	80.76	80.72	80.75
80.72	80.75	80.77	80.81
80.74	80.73	80.71	80.77
80.74	80.75	80.73	80.74
80.76	80.75	80.74	80.74
80.78	80.77	80.76	80.80
80.78	80.77	80.80	80.81

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Total No. of Pages :3

Seat No.	

T.E. (Mechanical) (Semester - VI) (Revised) Examination, November - 2017
INDUSTRIAL FLUID POWER
Sub. Code: 66838

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Draw neat diagrams/sketches wherever necessary.**
3) **Figures to right indicates full marks.**

Q1) Solve any two:

a) Explain in brief the basic requirements of a Pneumatic system. **[7]**

b) Explain the important properties of hydraulic fluids. **[7]**

c) Draw the symbols and explain the function of the following elements:**[7]**

i) F.R.L unit

ii) Four way, three position-open center solenoid operated D.C valve.

iii) Weight loaded Accumulator.

iv) time delay valve.

Q2) Solve any three:

a) Explain the working of swash plate type axial piston pump with neat sketch. **[6]**

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b) Explain the function of cushioning in cylinders with neat sketch. **[6]**

c) Explain fluid conditioning and also explain with neat symbols types of reservoirs. **[6]**

d) Classify intensifiers and explain any one of them. **[6]**

Q3) Solve any three:

a) Draw a schematic of 4/2 pilot operated DCV and briefly explain its function. **[6]**

b) Draw schematically a sequence valve and explain its function. **[6]**

c) Explain the working of pressure compensated flow control valve with neat sketch. **[6]**

d) Explain use of any two center positions of D.C valves in hydraulic circuits. **[6]**

Q4) Solve any three:

a) Explain with neat sketch working of screw compressor used in pneumatic systems. **[6]**

b) Explain schematically different piping layouts in Pneumatic systems. **[6]**

c) Explain with the help of neat sketch the construction and working of air motor. **[6]**

d) Explain the working of 5/2 Direction control valve with a neat sketch. **[6]**

Q5) Solve any Three.

a) A vehicle is raised and held for about five hours and is to be descended slowly without any jerks, suggest and draw a suitable hydraulic circuit for the same. **[6]**

b) Explain the speed control circuit for an air motor. **[6]**

c) With the aid of circuit diagram explain the use of shuttle valve in pneumatic circuit. **[6]**

d) Explain with circuit diagram travel dependent sequencing mechanism in hydraulic system. **[6]**

Q6) Write short notes on: (Solve any two)

a) Pneumatic servo system. **[7]**

b) Safety precautions in handling hydraulic systems. **[7]**

c) Fluidics. **[7]**

What will be your decision under the following approaches

i) Optimistic Criterion

ii) Pessimistic Criterion

iii) Leplace Criterion

iv) Hurwicz Criterion ($\alpha = 0.7$)

c) Draw the project network for the following activities and determine critical path and project duration.

Activity	Preceding activity	Duration (days)
A	-	8
B	A	12
C	A	8
D	B,C	7
E	A	8
F	D,E	17
G	C	21
H	F,G	9
I	H	11

d) Determine optimal sequence, elapsed time and idle time of the following six jobs on the machine M1,M2 and M3 used in the same sequence to process these jobs.

	Jobs					
Machines	J1	J2	J3	J4	J5	J6
M1	15	14	16	13	10	8
M2	8	10	7	15	11	9
M2	8	10	7	15	11	9

Total No. of Pages :4

Seat No.	

T.E. (Mechanical) (Part - II) (Semester - VI) (Revised) Examination, November - 2017

INDUSTRIAL MANAGEMENT & OPERATIONS RESEARCH

Sub. Code: 66837

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**
4) **All questions are to be solved on one answer book only.**

Q1) Attempt any four (5 Marks Each) **[20]**

a) State the need of planning in manufacturing a component from vendors.

b) Explain in brief Process of Organizing.

c) Is there any difference between Authority & Responsibility. Justify your answer with suitable example.

d) Discuss the implications of the Herzberg's theory as a strategy for motivating employees.

e) Whether controlling is an essential function of management? If yes then explain the steps involved in controlling process?

Q2) Attempt any two (6 Marks Each) **[12]**

a) Which factors related to environmental influence sugar manufacturing industry?

b) What are the problems of SSI involved in manufacturing components of automobile sector?

c) How to prevent an accident in a gas welding section of fabrication unit? Does the purchasing of safety equipments increases cost of operation?

Q3) Write short notes on any three (6 Marks Each) **[18]**

a) Types of markets

b) 4 P's of market

c) Functions of Purchase department

d) Purchase policy and procedure

e) Cost estimation

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Q4) Attempt any three (6 Marks Each) **[18]**

a) Define Operations Research. Briefly explain the characteristics of Operations Research.

b) Use graphical method to solve the following,

Maximize $Z = 5X_1 + 4X_2$

Subjected to constraints,

$5X_1 + 2X_2 \leq 40$,

$3X_1 + 3X_2 \leq 30$

$3X_1 + 5X_2 \leq 45$

$X_1, X_2 \geq 0$.

c) A company manufactures three jobs namely X, Y and Z. Each of the product require processing on three machines, Turning, Milling and Drilling. Product X requires 5 hours of turning, 2 hours of milling and 20 minutes of drilling. Product Y requires 3 hours of turning, 5 hours of milling and 30 minutes of drilling, and Product Z requires 1 hour of turning, 2 hours of milling and 30 minutes of drilling. In the coming planning period, 270 hours of turning, 220 hours of milling and 50 hours of drilling are available. The profit contribution of X,Y and Z are Rs. 500, Rs.750 and Rs. 1000 per unit respectively. Formulate LPP to maximize the profit. Suggest suitable method for solution of LPP.

d) Use simplex to solve the following problem and obtain initial and second feasible solution (two simplex tables only)

Minimise $Z = 5X_1 + 3X_2 + 2X_3$

subjected to constraints,

$3X_1 + 2X_2 + 2X_3 \leq 120$,

$2X_1 + 3X_2 + 3X_3 \leq 240$

$X_1, X_2, X_3 \geq 0$.

Q5) Attempt any two (7 Marks Each) **[14]**

a) How does the problem of degeneracy arise in a transportation problem? Explain how one can overcome it?

b) The unit transportation cost along with capacity and requirements from a supplier to a restaurant is as given below

Supplier	Restaurant				Capacity
	1	2	3	4	
A	25	40	75	20	4000
B	50	40	65	25	3000
C	25	50	70	40	3000
Requirements	1600	2400	3000	2000	

Obtain initial basic feasible solution by least cost method & VAM

c) A company has four workers and five jobs. Expected profit in Rs. for each job when assigned to different workers is given in the matrix below. Solve the assignment problem & estimate the total profit

Worker	Jobs				
	A	B	C	D	E
1	60	76	48	99	80
2	69	82	59	71	57
3	85	90	109	69	79
4	46	62	85	75	78

Q6) Write short notes on any three (6 Marks Each) **[18]**

a) Explain the various quantitative methods that are useful for decision making under risk.

b) The following matrix gives the payoff (in Rs.) of different strategies against events.

Strategies	Events			
	E_1	E_2	E_3	E_4
S_1	4,000	100	6,000	18,000
S_2	20,000	5,000	400	0
S_3	20,000	15,000	2,000	1,000

Total No. of Pages : 3

Seat No.

T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MANUFACTURING ENGINEERING

Sub. Code : 66245

Day and Date : Wednesday, 22 - 11 - 2017 Total Marks : 100

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume if necessary suitable data and state them clearly.
4) Use of non-programmable calculators is permissible.

SECTION - I

Q1) Solve any two:

a) Explain with neat sketch the types of milling cutters. [8]

b) Derive an expression for Shear strain. [8]

c) In an Orthogonal cutting of the material, Cutting force (F_H) =138Kg, Feed force (F_v) = 68Kg, Rake angle (α) =7°, Chip thickness ratio (r) = 0.4. Determine

i) Coefficient of friction of chip

ii) Shear force (Fs) and normal to shear force (Fn). [8]

Q2) Solve the following questions.

a) Define machinability. Explain the factors affecting machinability. How the machinability index is defined? [8]

OR

a) Explin concept of wear & types of wear with sketch. [8]

b) Determine [8]

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i) Taylor's Tool life equation

ii) Cutting speed for 6 minutes of tool life when tool life of 70 minutes is obtained at a speed of 25m/min and 15 minutes at 40m/min.

The component shown in fig. is to be processed on a single spindle automat. Study the component and prepare: **[18]**

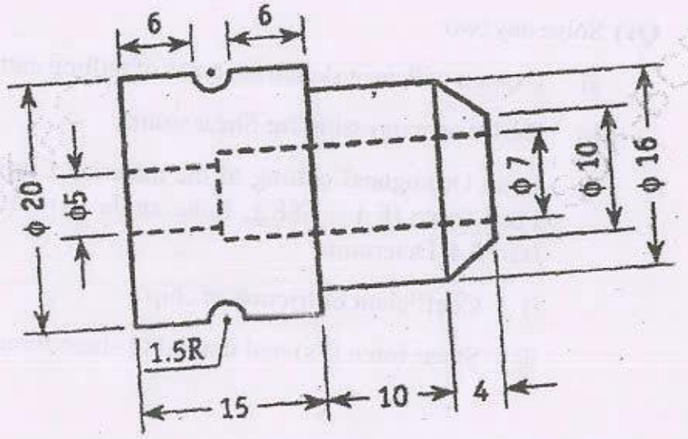
a) Detailed process sheet

b) Tool Layout

c) Cam profile for drilling operation-of ϕ5 mm hole through

d) Calculate Production rate per hour

Material –ϕ 20 Bronze bar All dimensions are in mm.



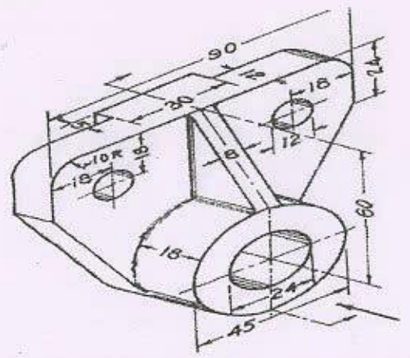
SECTION - II

Q4) Design & draw neat dimensional drawing in three views with one sectional view of jig for drilling two holes ϕ12 in the given bracket as shown in figure. **[26]**

OR

Design & draw neat dimensional drawing in three views with one sectional view of Milling fixture for creating plane surface of ϕ 24mm of the given bracket as shown in figure.

Also Justify the selection of location, clamping & guiding elements.



) Attempt any two.

a) Explain with neat sketch the Compound die. **[6]**

b) Explain types of Stock stop. **[6]**

c) Explain the importance of following in Press working **[6]**

i) Strippers

ii) Clearanace

[12]

6) Write short notes any three.

a) Construction & working of CNC.

b) Automatic Tool Changer.

c) CNC axes and drives.

d) Modular Tooling System.

Q6) a) Explain the step by step procedure for selection of V- belt from Manufacturer's Catalogue. [6]

b) It is required to select flat belt drive for a fan running at 360 rpm which is driven by a 10kW 1440 rpm motor. The belt drive is open type and space is available for a center distance of 2 m approximately. The belt should operate at velocity between 17.80 m/s to 22.90 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0118 kW. The load correction factor can be taken as 1.2. Suggest preferred pulley diameters for the motor and fan pulleys and give complete specifications of belting. Refer the tables given below. [10]

Arc of Contact Factor (F_d)

α_s(Deg)	130	140	150	160	170	180	190	200
F_d	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard Widths of these belts in mm

3–Ply	25	40	50	63	76					
4–Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

For flat pulleys: Series of preferred values of pitch diameters (in mm) are as follows.

Pitch diameter (mm):	125	132	140	150	160	170	180	0	
200	212	224	236	250	265	280	300	315	355	375
400	425	450	475	500	530	560	600	630	670	710
750	800	900	1000							

Total No. of Pages :4

Seat No.

T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MACHINE DESIGN - I

Sub. Code: 66244

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumption wherever required and state them clearly.**
4) **Use of non-programmable calculator is permitted.**
5) **Draw neat diagrams wherever necessary.**

Q1) Solve any Three: [18]

a) Summarize material selection procedure adopted for designing a machine element.

b) Name different theories of failure.Illustrate the use of theory of failure for brittle material.

c) Explain the design procedure for a turn-buckle with the help of neat sketch.

d) Write a note on design of bolted joints with load perpendicular to the axis of bolt.

Q2) a) A bell crank lever to raise a vertical load is shown in fig 2a. The vertical load to be lifted is 4500N. The lever consists of forged steel material and a pin at the fulcrum F. Assume following data for the lever material. Safe stress in tension = 75 MPa; safe stress in shear=60MPa; safe bearing pressure on pins=10N/mm². Determine the pin diameter at end P, dimensions at F and cross section Y-Y (near to fulcrum) [8]

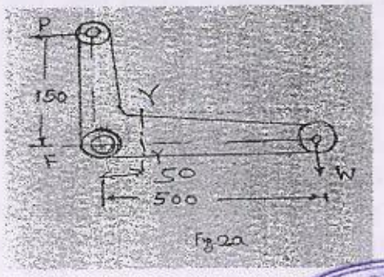
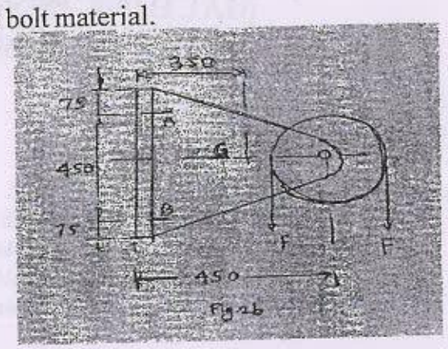


Fig 2a

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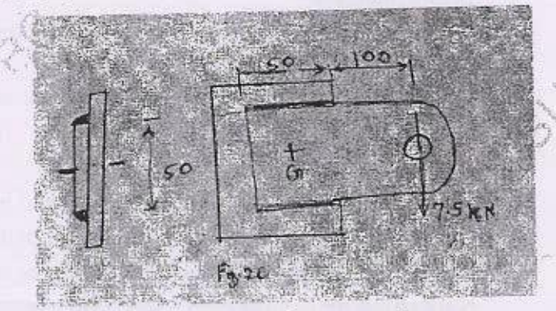
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b) Figure 2b shows a pulley bracket, which is supported by 4 bolts, two at A and two at B. The weight of pulley and bracket, W is 1850N, and the load, F on the rope is 20kN.
Determine the size of the bolts, using an allowable shear stress of 40 MPa for the bolt material. **[8]**



OR

c) A welded connection as shown in figure 2c is subjected to the eccentric force of 7.5 kN. Determine the size of welds if the permissible shear stress for the weld is 90N/mm². Assume static conditions. **[8]**



Q3) a) Discuss the design procedure for square key. **[6]**

b) A splined connection with the following particulars is used for a gear and shaft assembly in a gear box. The power to be transmitted is 20kW at 240 r.p.m. The bearing pressure on the splines is limited to 6.5.MPa during sliding. The coefficient of friction is 0.1 **[10]**
Major diameter = 60mm
Minor diameter = 54 mm
Number of splines = 10
Determine (i) The length of gear hub
ii) The force required to shift the gear.

OR

c) Design a cast iron protective type flange coupling to transmit 15 kW at 900 r.p.m. from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used:
Shear stress for shaft, bolt and key material =40MPa
Crushing stress for bolt and key = 80 MPa
Shear stress for cast iron = 8 Mpa
Draw a neat sketch of the coupling. **[10]**

Q4) a) What are the various types of springs used in practice? Explain one application of each. **[6]**

b) Design a close coiled helical compression spring for a service load ranging from 2245N to 2745N. The axial deflection of the spring for this load range is 6mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity is 84kN/mm². Assume squared and ground ends for coil. Neglect the effect of stress concentration. Draw fully dimensioned sketch of the spring.
Std. wire gauge (SWG) number and corresponding diameter of spring wire is given in the following table. **[10]**

SWG	6/0	5/0	4/0	3/0	2/0
Diam.mm	11.785	10.973	10.160	9.490	8.839

Q5) a) Derive an expression for maximum efficiency for square threaded screw. **[6]**

OR

What is recalculating ball screw? Explain with neat sketch.

b) The power transmission screw of a screw press is required to transmit maximum load of 100 kN and rotates at 60 RPM. The trapezoidal threads are to be used as under:

Nominal Dia. mm	40	50	60	70
Core Dia. mm	32.50	41.50	50.50	59.50
Mean Dia. mm	36.50	46.00	55.50	65.00
Core Area mm²	830	1353	2003	2781
Pitch mm	7	8	9	10

The screw thread friction coefficient is 0.12. The torque required for collar friction and journal bearing is about 10% of the torque to drive the load considering screw friction. Determine screw dimensions and its efficiency. Also determine the motor power required to drive the screw. The maximum permissible compressive stress in the screw is 100 MPa. **[12]**

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Total No. of Pages : 3

Seat No.	

T.E. (Mechanical) (Part-III) (Semester-V) (Revised)
Examination, November - 2017
HEAT AND MASS TRANSFER
Sub. Code : 66243

Day and Date : Tuesday, 14-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume Suitable Data wherever necessary and state it Clearly.**
4) **Use of scientific non programmable calculator is permitted.**

Q1) Solve any three:

a) Define critical radius of insulation. Also derive the equation for critical radius of insulation for hollow sphere. **[6]**

b) Explain the different modes of mass transfer. Explain with suitable examples. **[6]**

c) A 0.8m high and 1.5m wide double pane window consist of two 4mm thick layer of glass (k = 0.78 W/mK) separated by 10mm wide stagnant air space (k = 0.0626 W/mK). Determine the rate of heat transfer through this window when room is maintained at 20°C and outside air is at -10°C. Take convective heat transfer coefficient as 10 and 40 W/m²K. **[6]**

d) An aluminum pipe carries steam at 110°C. The pipe (k = 185 W/mK) has an inner diameter of 10cm and outer diameter of 12cm. The pipe is located in a room where the ambient air temperature is 30°C and convective heat transfer coefficient is 15 W/m²K. Determine heat transfer rate per unit length of pipe. Neglect convective heat transfer on steam side. **[6]**

Q2) Solve any two:

a) Derive expression for temperature distribution of a solid cylinder generating heat at the rate of q unit per unit volume. **[8]**

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b) Derive expression of temperature distribution for a solid body by using lumped heat capacity approach. **[8]**

c) A solid copper sphere of 10cm diameter (ρ = 8954 kg/m^3, C_p = 383 J/kgK, k = 386 W/mK). Initially at uniform temperature 250°C, it suddenly immersed in a fluid which is maintained at uniform temperature of 50°C. The heat transfer coefficient between sphere and fluid is 200 W/m^{2}K. Determine the temperature of copper sphere at 5 minutes after immersion. **[8]**

Q3) Solve any two:

a) Derive an expression for temperature distribution along the length of a pin fin with insulated tip. **[8]**

b) A 1m long, 5cm diameter cylinder placed in an atmosphere of 40°C is provided with 12 fins (k = 75 W/mK), 0.75mm thick, The fins protrudes 2.5cm from the cylinder surface. The heat transfer coefficient is 23.3 W/m^{2}K. Calculate the rate of heat transfer if the surface temperature of cylinder is 150°C. **[8]**

c) Determine thermal conductivity of long solid 2cm diameter rod, 1 end of the rod is inserted in a furnace while remaining portion is projected out in air at 30°C. After steady state has been reached, the temperature at two points on the rod which are 10cm apart are measured and found to be 120°C and 90°C respectively. If heat transfer coefficient is 20 W/m^{2}K. What will be thermal conductivity of the rod? **[8]**

Q4) Solve any two of the following:

a) With the help of dimensional analysis, analyze natural convection heat transfer problem. **[8]**

b) A vertical cylinder 1.5m high and 180mm in diameter is maintained at 100°C in an atmosphere environment of 20°C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean film temperature as, ρ= 1.06 kg/m^3, γ= 18.97×10^{-6}m^2/s, C_p=1.004 kJ/kg°C and k=0.0285 w/m°C, Pr = 0.708. **[8]**

Use correlation; $Nu_L = 0.10\ (Gr.Pr)^{1/3}$.

c) Air at a temperature of 20°C flows through a rectangular duct with a velocity of 10m/s. The duct is 30cm×20cm in size and air leaves at 34°C. Find the heat gain by air when it is passed through 10m long duct. The properties of air at 27°C are ρ=1.1774 kg/m^3, γ= 15.68 10^{-6}m^2/s, C_p=1057 J/kgK and k=0.03003 W/mK, Pr = 0.708. **[8]**

Use correlation ; $Nu = 0.023\ (Re)^{0.8}\ pr^{0.4}$.

Q5) Solve any two of the following:

a) Write a short notes on; **[8]**

i) Shape factor and its properties

ii) Radiation shield

b) Write plank's law and derive Stefan Boltzman law from Plank's law. **[8]**

c) The effective temperature of a body having an area of 0.12m^2 is 527°C. **[8]**

Calculate;

i) The total rate of energy emission

ii) The intensity of normal radiation

iii) The wavelength of maximum monochromatic emissive power

Q6) a) Draw the temperature distribution curve for following heat exchangers (any 3) **[6]**

i) Counter flow heat Exchanger

ii) Evaporator

iii) Parallel flow heat Exchanger

iv) Condenser

b) What are the design considerations of heat exchangers? **[6]**

c) The flow rates of hot and cold water streams running through a parallel flow heat exchanger are 0.2kg/s and 0.5kg/s respectively. The inlet temperatures of hot and cold sides are 75°C and 20°C respectively. The exit temperature of hot water is 45°C. If overall heat transfer coefficient is 325 W/m^{20}C, calculated the area of heat exchanger. Assume C_p of water 4.187 kJ/kgK. **[6]**

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b) The crank and the connecting rod of a 4 - cylinder in-line engine running at 1800 r.p.m. are 60 mm and 240 mm each respectively and the cylinders are spaced 150 mm apart. If the cylinders are numbered 1 to 4 in sequence from one end, the cranks appear at intervals of 90° in an end view in the order 1 - 4 - 2 - 3. The reciprocating mass corresponding to each cylinder is 1.5 kg. Determine:

i) Unbalanced primary and secondary forces, if any, and

ii) Unbalanced primary and secondary couples with reference to central plane of the engine. **[12]**

Q6) a) Derive expression for energy stored in a flywheel. **[6]**

b) A single cylinder double acting steam engine develops 150 kW at a mean speed of 80 rpm.The coefficient of fluctuation of energy is 0.1 and the fluctuation of speed is ± 2% of mean speed. If the mean diameter of the flywheel rim is 2 metre and the hub and spokes provide 5 % of the rotational inertia of the flywheel, find the mass and cross-sectional area of the flywheel rim. Assume the density of the flywheel material as 7200 kg/m^3. **[10]**

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Total No. of Pages :4

T.E. (Mechanical Engineering) (Part - III) (Semester - V) (Revised) Examination, November - 2017
THEORY OF MACHINES - II
Sub. Code: 66242

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume if necessary suitable data and state clearly.**
5) **Use of Non programmable calculator is permitted.**

Q1) a) Give the classification of Toothed Gearing and define the following terms.

i) Addendum.

ii) Module. **[8]**

OR

Derive the expression for the velocity of sliding between pair of involute teeth and define the terms.

i) PitchCircle.

ii) Diametral Pitch.

b) A pair of Spur gears with involute teeth is to give a gear ratio of 4 : 1. The arc of approach is not to less than the circular pitch and smaller wheel is the driver. The angle of pressure is 14.5°. Find

i) the least number of teeth that can be used on each wheel and

ii) the addendum of the wheel in terms of the circular pitch. **[10]**

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2) a) What are the various types of the torques in an epicyclic gear train. **[6]**

OR

Explain the concept of equivalent mass and moment of inertia applied for gear trains.

b) Fig. 2 b shows an epicyclic gear train with compound planets 'B - C', 'B' has 15 teeth and meshes with an annulus 'A' which has 60 teeth. 'C' has 20 teeth and meshes with the sunwheel 'D' which is fixed. The annulus is keyed to the propeller shaft 'Y' which rotates at 740 rad/s. The spider which carries the pins upon which the planets revolve is driven directly from main gear box by shaft 'X', this shaft being relatively free to rotate with respect to wheel 'D'. Find the speed of shaft 'X', when all the teeth have same module. When engine develops the 130 kW, what is the holding torque on the wheel 'D'? Assume 100 percent efficiency throughout. **[10]**

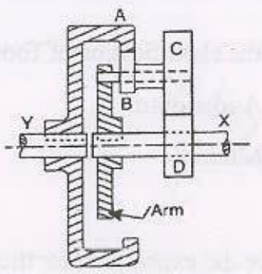


Fig. 2 b.

3) a) Condition for stability of two wheel vehicle moving in a curved path. **[6]**

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 rpm. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic couple in the following conditions.

i) The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.

ii) The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.

iii) The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern. **[10]**

4) a) Derive the equation for inertia torque analytically considering the effect of inertia of the connecting rod. **[6]**

OR

Derive an expression for velocity and acceleration of the slider of slider crank mechanism.

b) In a vertical double acting steam engine, the connecting rod is 4.5 times the crank. The weight of the reciprocating parts is 120 kg and the stroke of the piston is 440 mm. The engine runs at 250 rpm. If the net load on the piston due to steam pressure is 25 KN when the crank has turned through an angle of 120° from the top dead centre, determine the

i) thrust in the connecting rod.

ii) pressure on the slide bars.

iii) tangential force on the crank pin.

iv) thrust on the bearings.

v) turning moment on the crank shaft. **[10]**

5) a) Explain balancing of single rotating mass by two masses rotating in different planes. **[6]**

OR

Explain direct and reverse crank method for balancing of radial engine.

SUK-BCE

Q4) a) Sketch root locus plot for $G(S)\,H(S) = \dfrac{K}{S(S^2+6.S+12)}$. [12]

b) A unity feedback control system is having an open loop transfer function $G(S) = \dfrac{K(S+13)}{S(S+3)(S+7)}$. Determine the range of values of K for the system to be stable. [6]

Q5) a) Sketch the Bode plot for the transfer function $G(S) = \dfrac{1000}{S(1+0.1.S)(1+0.001.S)}$. Determine gain margin and phase margin. [10]

b) Calculate break in point and angle of departure for the control system, given by characteristic equation $S^2 + 2S + 3 + K(S+2) = 0$. [6]

Q6) a) The motion of a numerically controlled machine tool is described by the differential equation $\ddot{y} + 7.\dot{y} + 10.y = f(t)$. Determine computer diagram and state space representation using parallel method. [8]

b) The motion of robot arm controlled by an electric motor is given by the differential equation $\ddot{y} + 6.\dot{y} + 9.y = f(t)$. Use series programming to determine computer diagram. [8]

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Total No. of Pages : 4

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T.E. (Mechanical) (Semester - V) Examination, November - 2017

CONTROL ENGINEERING

Sub. Code : 66241

Day and Date : Thursday, 09 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right Indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

Q1) a) For the mechanical system shown in Fig. 1 a, prepare grounded chair representation and construct electrical circuit using force current analog. [6]

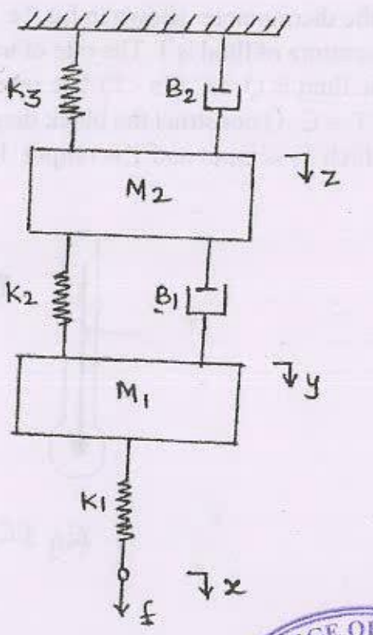


fig 1 a

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b) For the fluid system shown in Fig. 1b, determine equation of P1 in terms of P2 and P. [6]

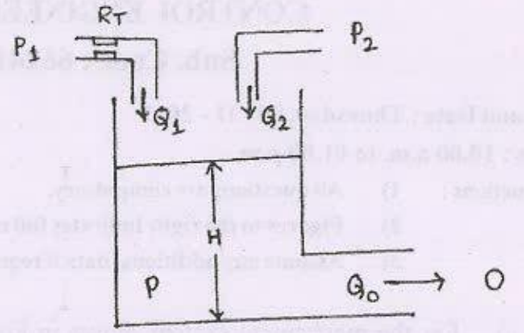


fig 1 b

c) For the thermometer shown in fig. 1c, the ambient temperature is Ts and temperature of fluid is T. The rate of heat flow from surrounding medium to the fluid is $Q = C_1(Ts - T)$ The rate of change of temperature of fluid is $D.T. = C_2.Q$ construct the block diagram representation for the system in which Ts is input and T is output. Determine time constant. [6]

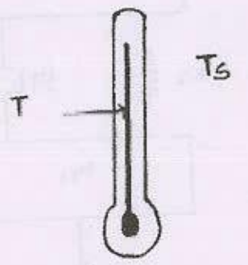


fig 1C

22) a) Determine linear approximation for the equation $Z = \sin X . \cos Y$ for $Xi = 60°$ and $Yi = 30°$, What is approximate value of Z when $X = 63°$ and $Y = 28°$. [8]

b) Reduce the block diagram shown in fig. 2b and obtain transfer function. [8]

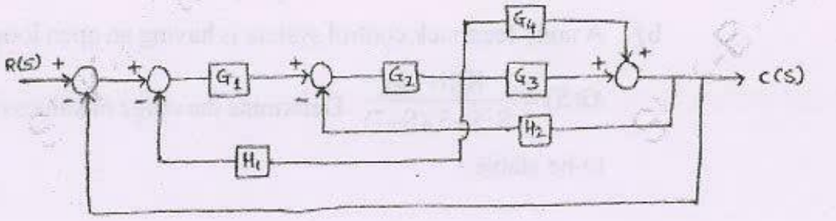


fig 2 b

23) a) A hydraulic control system is shown in fig. 3a. The forcing function is $r(t) = u(t)$ and all initial conditions are zero. Determine the response c(t) of system. [8]

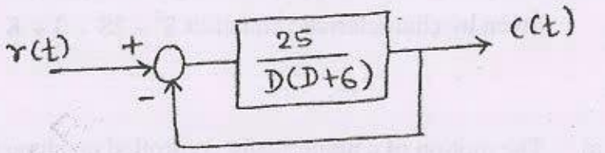


fig. 3 a

b) For the control system shown in fig. 3b, determine K_1, K_2 and a such that the system will have a steady state gain of 1, a natural frequency of 2 and damping ratio of 0.5. [8]

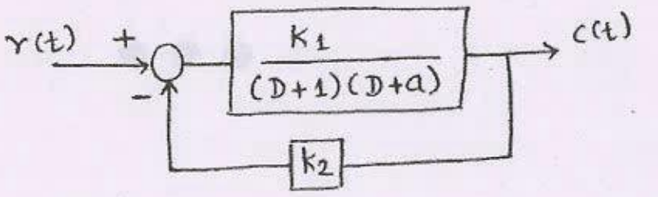


fig. 3 b

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T.E. (Mechanical Engg.) (Part - III) (Semester-VI) Examination, November - 2017

MACHINE DESIGN - II

Sub. Code : 66840

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat sketches whenever necessary.**
3) **Figures to the right indicate full marks.**
4) **Make suitable assumptions if necessary and state it clearly.**

SECTION-I

Q1) a) Define stress concentration. What are causes and remedies over stress concentration? **[8]**

OR

a) Explain the following terms in relation with design of component subjected to fluctuating loads:
   i) Endurance limit
   ii) Surface finish factor
   iii) Size factor
   iv) Notch sensitivity

b) A work cycle of a mechanical component subjected to completely reversed bending stresses consist of the following three elements: **[8]**
   i) $\pm$ 350 N/mm^2 for 85% of time
   ii) $\pm$ 400 N/mm^2 for 12% of time
   iii) $\pm$ 500 N/mm^2 for 3% of time

   The material for the component is 50C4 (S_{ut} = 660 N/mm^2) and the corrected endurance limit of the component is 280 N/mm^2. Determine the life of the component.

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Q2) a) Explain the following terms in connection with roller bearing, **[8]**

i) Static load capacity

ii) Dynamic load capacity

iii) Equivalent load capacity

iv) Load - life relationship

OR

a) Differentiate between static and dynamic capacity of the ball bearing. What is their significance in the selection of the bearings?

b) A deep-groove ball bearing having bore diameter of 60 mm and rotating at 1440 r.p.m. is subjected to radial force of 2500N and an axial force of 1200 N. The radial and thrust factors are 0.56 and 2.0 respectively. The load factor is 1.2. The expected rating life is 25,000 hrs. Calculate the required dynamic load capacity and select the bearing from manufacturer's catalogue given below in table no. 1. **[8]**

Table no.1

Principal Dimensions				Basic Capacity	
Bearing No.	Bore Dia 'd' mm	Outside Dia 'D'mm	Width 'B' mm	Static 'Co' kN	Dynamic 'C' kN
6012	60	95	18	23.20	29.60
6212	60	110	22	32.50	47.50
6312	60	130	31	52.00	81.90
6412	60	150	35	69.50	108.00

Q3) a) Explain the following terms in relation to sliding contact bearings, **[8]**

i) Length to diameter ratio

ii) Unit bearing pressure

iii) Radial Clearance

iv) Minimum film thickness

OR

a) With neat sketches, describe construction and working principles of hydrodynamic bearings.

b) The following data is given for a 360° hydrodynamic bearing. **[10]**

Radial load = 3.2kN

Journal speed = 1490 rpm

Journal diameter = 50 mm

Bearing length = 50 mm

Radial clearance =0.05 mm

Viscosity of lubricant = 25 cp

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate

i) Coefficient of friction

ii) Power lost in friction

iii) Minimum oil film thickness

iv) Flow requirement in litres/min

v) Temperature rise

Refer following data table:

l/d	ε	h_0/C	S	ϕ	(r/C)f	$Q/(rCn_sl)$
1	0.1	0.6	0.264	63.10	5.79	3.99
	0.6	0.4	0.121	50.58	3.22	4.33
	0.8	0.2	0.0446	36.24	1.70	4.62
	0.9	0.1	0.0188	26.45	1.05	4.74
	0.97	0.03	0.0047	15.47	0.514	4.82

SECTION - II

Q4) a) Explain different types of gear tooth failure. **[8]**

OR

a) Explain the force analysis in the design of spur gears.

b) It is required to design a pair of spur gears with 20° full-depth involute teeth consisting of a 20-teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW, 1450 rpm electric motor. The starting torque of the motor can be taken as 150% of the rated torque. The material of the pinion is plain carbon steel Fe410 (S_{ut} = 410 N/mm^2), while the gear is made of grey cast iron FG 200 (S_{ut} = 200 n/mm^2). The factor of safety is 1.5. Design the gears based on the Lewis equation and using velocity factor to account for the dynamic load. Lewis form factors for 20 and 50 teeth are 0.32 and 0.408 respectively. Assume pitch line velocity as 5 m/s. Recommended series of module: 7 or 9. **[8]**

Q5) a) Derive expression for wear strength of helical gears. **[8]**

OR

a) Explain with neat sketch the concept of virtual number of teeth and its significance in the design of helical gear.

b) A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and the normal pressure angle is 20°. The normal module is 3mm. Calculate **[10]**

i) The transverse module
ii) The transverse pressure angle
iii) The axial pitch
iv) The pitch circle diameters of the pinion and the gear
v) The centre distance and
vi) The addendum and dedendum circle diameter of the pinion

Q6) a) Explain with neat sketch the force analysis of bevel gear. **[8]**

OR

a) Explain the strength rating of worm gearing.

b) A pair of worm gears is designated as 1/30/10/8 Calculate **[8]**

i) The centre distance
ii) The speed reduction
iii) The dimensions of the worm and
iv) The dimensions of the worm wheel

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T.E. (Mechanical) (Part - III) (Semester - VI) (New) (Revised) Examination, November - 2017

INTERNAL COMBUSTION ENGINES

Sub. Code: 66841

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt all the questions.**

2) **Make suitable assumptions if necessary and clearly mention them.**

3) **Figure to right indicate full marks.**

Q1) a) Define the following terms **[8]**

i) Clearance volume.

ii) Swept volume.

iii) Thermal efficiency.

iv) Air standard efficiency.

OR

b) Classify IC Engine and explain each type with examples. **[8]**

c) Explain with neat sketch port timing diagram for two stroke petrol engine. **[8]**

Q2) a) A four cylinder, four stroke square engine running at 40 rev/sec has a carburetor venturi with a 3 cm throat. Assuming the bore to be 10 cm, volumetric efficiency of 75%, the density of air to be 1.15 kg/m^3 and coefficient of air flow to be 0.75. Calculate, **[9]**

i) Engine volume sucked per second and mass flow rate.

ii) Suction pressure at throat.

b) Explain the following terms. **[9]**

i) Air fuel ratio and its types.

ii) Air fuel requirements for SI engine.

iii) Petrol injection in SI engine.

OR

c) Explain the injection nozzles used in CI engine and its types. **[9]**

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Q3) a) Write types of combustion chamber for SI engine and explain requirements of Combustion chamber. **[8]**

OR

b) Explain the factors influenced of engine variable on flame speed. **[8]**

c) Explain the effect of various engine variables on detonation. **[8]**

Q4) a) What modification is required, if the existing engine is to be supercharged? What are various methods of turbo charging? **[8]**

b) Explain with figure abnormal combustion in CI engine. Discuss for the control of knocking for CI engine. **[8]**

Q5) a) Discuss the various pollution norms and devices used for the control of engine emissions. **[8]**

b) What do you mean by induction swirl in combustion chamber of C I Engines? Discuss the advantages and disadvantages of the induction swirl. **[8]**

OR

b) What are the different methods to measure frictional power of ic engines. Explain Morse test. **[8]**

Q6) a) List the advanatges and disadvantages of supercharging of diesel engine. **[7]**

OR

a) Describe the sources for the production of Biodiesel and its advantages for utilization in IC engines. **[7]**

b) A four stroke petrol engine develops 50 kW and consumes 16 liters of petrol per hour of specific gravity 0.755. The calorific value of fuel used is 44500kJ/kg. Find its indicated thermal efficiency. If engine runs at 3000 rpm. It develops the mean effective pressure of 5.2 bar. Determine the bore and length of stroke if stroke length is 1.1X bore. **[7]**

c) Write notes on HC Emission and their control. **[4]**

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Seat No.	

Total No. of Pages : 3

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

MACHINE TOOLS & PROCESSES

Sub. Code : 63364

Day and Date : Tuesday, 07 - 11 - 2017

Time : 10.00 a.m. to 01.00 p.m. **Total Marks : 100**

Instructions : 1) All Questions are compulsory.

2) Figures to the right indicate full marks

3) Assume suitable data, if necessary.

4) Use of Non-programmable Scientific Calculator is allowed.

Q1) Attempt any four (4 marks each) :

a) Explain the properties of molding sand . Suggest the methods to measure the same. [4]

b) State the function of riser in the gating system. [4]

c) What are the steps involved in gravity die casting. [4]

d) Draw neat sketch of cupola furnace and name the parts. [4]

e) List the defects related to molding process? Explain any two of them. [4]

Q2) Attempt any four (4 marks each) .

a) Briefly explain principle of rolling with neat sketch. [4]

b) Distinguish between open and closed die forging processes. [4]

c) Show by schematic sketches the process of forward extrusion. Give two examples of components produced by extrusion. [4]

d) Why is lubrication difficult in wire drawing process? State the methods generally employed in it. [4]

e) Indicate by means of flow diagram the different stages in manufacture of 50 mm diameter rod from a steel ingot. [4]

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Q3) Write a short note on (Any Three) :

a) Advantages and Limitations of sand casting process [6]

b) Defects in forging [6]

c) Injection molding [6]

d) Thermoforming process for plastic [6]

Q4) Attempt any four (4 marks each)

a) A lathe is provided with a change gear set from 20 to 125 teeth in steps of 5 teeth and an additional gear of 127 teeth. Find the gear train for cutting metric thread of 3 mm pitch on a lathe having lead screw pitch as 6 TPI. [4]

b) How are a capstan and turret lathe headstock classified? Describe any one of them. [4]

c) Describe in brief working principle of boring machine. [4]

d) Draw neat sketch of following operations performed on drilling machine. [4]

i) Countersinking

ii) Counterboring

e) Give the specification of lathe. [4]

Q5) Attempt any four (4 marks each) :

a) Explain the method of carrying out an operation on shaper. [4]

b) Outline the procedure of planning vertical surfaces. [4]

c) Make a neat sketch of Universal milling machine. State its advantages. [4]

d) What are various tool holding devices used on milling machine? [4]

e) Compare the gear shaving with gear rolling. [4]

Q6) Write a short note on (Any Three) :

a) Abrasive Jet Machining advantages & limitations [6]

b) Application of Electro- Chemical machining with neat sketch [6]

c) Water jet machining process [6]

d) Various operations performed on milling machine [6]

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester-IV) (Revised) Examination, November - 2017

THEORY OF MACHINES - I

Sub. Code : 63363

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **Attempt all questions.**
2) **Figures to the right indicates full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume suitable data, if necessary and state clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) a) Write a note on Grubler's criterion for planar mechanism. **[8]**

OR

a) Explain the inversions of single-slider crank chain with neat sketches. **[8]**

b) A reciprocating engine mechanism is shown in fig.1.b. Crank OC is 60 mm long and connecting rod CP is having length of 180mm. By using Klein's construction method, find the velocity and acceleration of the piston if the crank is rotating at 180 r.p.m. **[8]**

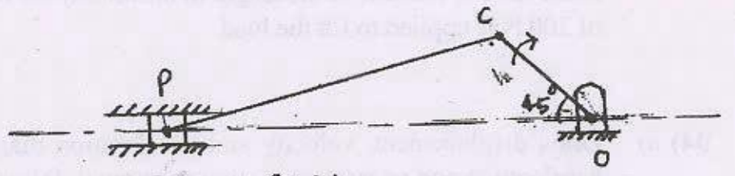


fig.1.b

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Q2) Crank OA of the quick return mechanism shown in fig. 2. revolves at a uniform speed of 250 r.p.m. in clockwise direction. The dimensions of various links are: OA = 75 mm, PQ = 375 mm, and QR = 400 mm. Crank makes 45° with vertical line PO. Find: i) velocity of R, ii) acceleration of R and iii) angular acceleration of QR. **[18]**

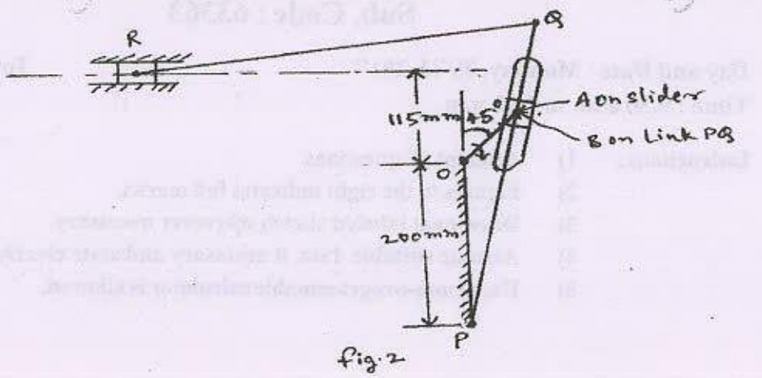


fig. 2

Q3) a) Derive the equation for friction torque in case of conical pivot bearing assuming uniform pressure with usual notations. **[8]**

OR

a) Derive the equation for friction torque in case of flat pivot bearing assuming uniform pressure condition. **[8]**

b) A screw jack has square threaded screw with mean diameter of 40 mm. The pitch of the thread is 6 mm and the coefficient of friction at the screw is 0.16. The load to be lifted is 25 kN and is supported by a collar having mean diameter of 50 mm and the coefficient of friction at the collar is 0.18. Determine the length of the tommy bar required if an effort of 200 N is applied to lift the load. **[8]**

Q4) a) Draw displacement, velocity and acceleration diagram for Uniform acceleration and retardation motion program of follower. **[4]**

b) A cam is operating an oscillating roller follower having SHM during outward and return stroke. Draw the cam profile for the following given data;

Distance of roller centre from cam centre at the start of ascent = 60 mm;

Follower arm length = 80 mm; Distance of pivot point from cam centre = 100 mm;

Angle of ascent = 60°; Angle of descent = 90°; Angle of dwell in between = 45°

Angle of oscillation of follower arm during ascent and descent = 15° **[14]**

Q5) a) Derive the equation of ratios of belt tensions in case of flat belt drive. **[6]**

OR

a) Explain slip and creep in belt. **[6]**

b) An open belt running over two pulleys 240 mm and 600 mm diameter connects two parallel shafts 3m apart and transmits 4 kW from smaller pulley that rotates at 300 rpm. Coefficient of friction between the belt and pulley is 0.3 and safe working tension is 10 N per mm width. Determine minimum width of belt, initial tension in belt. **[10]**

Q6) a) Explain controlling force and controlling curve. **[6]**

OR

a) Explain the terms height of governor, Isochronism and stability related to governor. **[6]**

b) In a porter governor, each of the four arms is 400 mm long. The upper arms are pivoted on the axis of rotation whereas the lower arms are attached to the sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and the load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of 250 mm and 300 mm of rotation of governor balls? **[10]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Seat No. [ ]

Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

ii) Discharge through nozzle = 0.18 m^3/s

iii) Area of the jet = 7500 mm^2

iv) Power available at the shaft = 44 kW

v) Mechanical efficiency = 94%

Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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b) An axial flow compressor with compression ratio 6, draws air at 25°C, delivers it at 60°C. Assuming 50% degree of reaction, find the velocity of flow if the blade velocity is 100 m/sec and also find the number of stages. Take work factor = 0.85, $\alpha_1 = 10°$ & $\beta_1 = 40°$, $C_p = 1$ kJ/kgK. **[8]**

Q6) a) Give the methods of improving the specific output and thermal efficiency of gas turbine and explain gas turbine with intercooling arrangement. **[8]**

b) An open gas turbine plant works between the fixed absolute temperature limits 350 K, 1550 K, the absolute pressure limits being 1 bar and 14 bar. The isentropic efficiency of compressor is 0.85 and that of turbine 0.86. Estimate the net work done by the turbine. The calorific value of the fuel is 4200 kJ/kg.

Assume

Efficiency of combustion chamber is 0.99,

Mechanical efficiency of whole assembly is 0.98,

Efficiency of generator is 0.985

Fuel air ratio = 1 : 54.06 and $m_a = 500$ kg/s. Take Cp = 1.005 kJ/kgK for air and gas. **[8]**

OR

b) Operating conditions of the Gas turbine unit are given below

i) The isentropic efficiency of compressor = 0.85

ii) The isentropic efficiency of turbine = 0.82

iii) A turbine unit has a pressure ratio 7:1

iv) Maximum cycle temperature is 620°C

v) The air enters the compressor at 15°C at the rate of 20 kg/s

Then calculate the workdone by turbine, compressor work and total work.

Take Cp = 1.005 kJ/kgK and $\gamma = 1.4$ for the compression and Cp=1.11 kJ/ kgK and $\gamma = 1.35$ for the expansion. **[8]**

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Seat No. [ ]

Total No. of Pages : 4

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

FLUID AND TURBO MACHINERY

Sub. Code: 63362

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**
4) **Use of non-programmable calculator is allowed.**

Q1) a) Explain the different efficiencies of the turbine. **[8]**

b) The following data were obtained from a test on a Pelton wheel **[8]**

i) Head at the base of nozzle = 32m

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Calculate the power lost

1) In the nozzle

2) In the runner

3) In mechanical friction

OR

c) A turbine work under a head of 200 m and it develops 6000 kW at 200 rpm. The overall efficiencies 87%. Find its unit quantities. A model is to built which is similar to above turbine in all respect having the scale 1:10, it is tested under a head of 20m. find the speed, discharge and specific speed of model having the same overall efficiency as turbine. **[8]**

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Q2) a) What is governing of turbine? Explain governing of Francis turbine with neat sketch. [8]

b) An inward flow reaction turbine has outer diameter of 1m and inner diameter 0.5m. The vanes are radial at the inlet and discharge is radial at the outlet. Water enters vane at an angle of 10°. Assuming velocity of flow to be constant at 3m/sec. Find speed of the wheel and vane angle at outlet. [8]

OR

c) A Kaplan turbine works under head of 16m. Runner diameter is 2.5 times diameter of hub; speed of turbine is 105 rpm. Angle of vane tip at outlet extreme edge is 20° and K_f=0.6. [8]

Assume radial discharge.

Calculate i) Runner diameter

ii) Hub diameter

iii) Discharge through turbine

Q3) a) Define specific speed of pump and obtain expression of it. What is significance of it? [8]

b) Write short notes (any two) [10]

i) Priming and its necessity

ii) NPSH

iii) Derive expression for minimum starting speed of centrifugal pump.

OR

c) i) A centrifugal pump is running at 1000 rpm. The outlet vane angle of impeller is 45° and velocity of flow at out 2.5 m/sec. Discharge through pumps is 200 lit/sec working against total head of 20m. If manometric efficiency is 80%, find impeller diameter and width of impeller at outlet. [5]

ii) Centrifugal pump of impeller diameter 0.30m discharging 0.03 m^3/s water against a total head of 15 m and the pump is running at 1000 rpm. Find the discharge, head and ratio of power of a geometrically similar pump of diameter 0.15 m when it is running at 2500 rpm. [5]

Q4) a) Prove that the expression for volumetric efficiency in reciprocating compressor with effect of clearance volume is

$$n_v = 1 - \frac{V_C}{V_S}\left[\left(\frac{P_2}{P_1}\right)^{\frac{1}{n}} - 1\right]$$

Where,

V_c is Clearance volume, V_s is swept volume and P_2/P_1 is the pressure ratio. Also discuss the effect of Clearance ratio on the volumetric efficiency of the compressor. [8]

b) Write short notes on any two: [10]

i) Requirement of multistage of reciprocating compressors.

ii) Workdone by reciprocating compressor during adiabatic and isothermal compressions.

iii) Classification of reciprocating compressors.

OR

b) i) A single acting single stage compressor is belt driven from an electric motor at 400 rpm. The cylinder diameter is 15cm and the stroke 17.5 cm. The air is compressed from 1 bar to 7 bar and the law of compression $PV^{1.3}$ = Constant. Find the power of the motor, if transmission efficiency is 97% and the mechanical efficiency of compressor is 90%. Neglect clearance effect. [5]

ii) The pressure in the mains of compressor air service is to be 8 bar and a supply of 28 m^3/hr at 15°C and that pressure is to be maintained. The air is compressed from an initial pressure 1 bar by a two stage compressor in which the compression is adiabatic. The air is cooled to its initial temperature of 15°C in the inter cooler. What is the minimum power required to compress the air? Take R = 287 J/kgK. [5]

Q5) a) Explain the concept of Slip factor and Power input factor. [8]

b) A Centrifugal compressor delivers 40 kg of air per minute at a pressure of 3 bar and 120° C. The intake pressure and temperature of the air is 1 bar and 25°C. If no heat loss to the surrounding, find

i) Index of compression

ii) Power required, if the compression is isothermal

(Take R = 287 J/kgK and C_p = 1.005 J/kgK) [8]

OR

b) A cantilever of length 2 m carries a UDL of 2 kN/m over a length of 1 m from the free end and a point load of 1kN at the free end. Find the slope and deflection at the free end if $E=2.1\times10^5 N/mm^2$ and $I=6.667\times10^7 mm^4$ **[8]**

OR

b) State the importance of theories of failure and explain the maximum Principal stress theory. **[8]**

Q6) a) State the assumptions made in Euler's column theory and derive its expression for the crippling load when both the ends of the column are hinged. **[8]**

b) The maximum stress produced by pull in bar of length 1m is 150 N/mm^2. The area of cross sections and lengths are as shown in fig.5. Calculate the strain energy stored in a bar if $E=2\times10^5 N/mm^2$ **[8]**

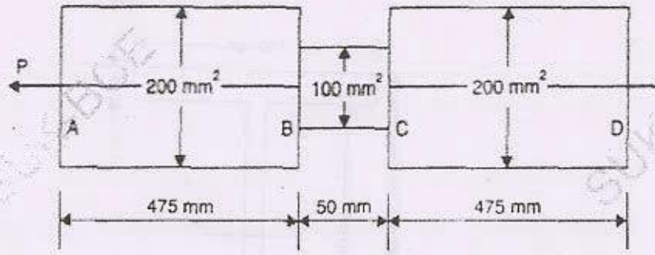


Fig. 5

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Total No. of Pages :4

Seat No.

S.E. (Mechanical) (Semester - IV) Examination, November - 2017
ANALYSIS OF MECHANICAL ELEMENTS
Sub. Code:63361

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary and state it clearly.**
3) **Figures to the right indicate full marks.**
4) **Draw neat and labeled sketches wherever necessary.**
5) **Use of non programmable calculator is allowed.**

Q1) a) Three pillars two of aluminum and one of steel support a rigid platform of 200 kN as shown in the fig.1. If area of each aluminum pillar is 1000 mm^2 and that of steel pillar is 800mm^2, find the stresses developed in each pillar.

Take$E_a = 1\times10^5 N/mm^2$ and $E_s = 2\times10^5 N/mm^2$. What additional load P, can it take, if working stresses are 65N/mm^2 in aluminum and 150N/mm^2 in steel? **[12]**

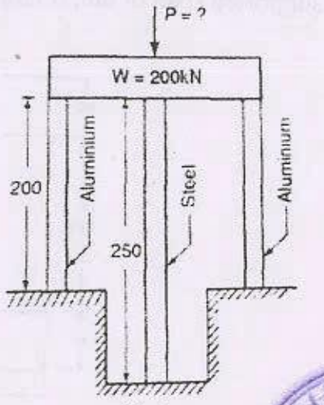


Fig.1

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b) Explain thermal stresses and hence derive the expression for thermal stress induced in a bar with its ends fixed by rigid support. **[6]**

OR

b) A hollow circular shaft 200 mm external diameter and thickness 25mm is transmitting power at 200 rpm. The angle of twist over the length of 2m was found to be 0.5°. Calculate the power transmitted and the maximum shear stress induced in the shaft. Take modulus of rigidity as 84 kN/mm² **[6]**

2) Draw SFD and BMD for loading condition shown in fig 2. Locate point of contraflecture and maximum bending moment if any. **[16]**

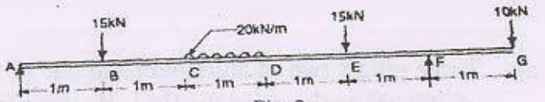


Fig. 2

)3) A cast iron beam has I section with top flange 80 mm ×40 mm, wed 120 mm ×20mm and bottom flange 160 mm×40 mm. as shown in Fig 3 if tensile stress is not to exceed 30 N/mm² and compressive stress 90N/ mm²,what is the maximum UDL the beam can carry over a simply supported span of 6m, if larger flange is in tension.

16]

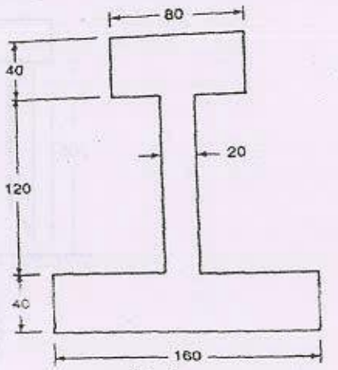


Fig. 3

4)a) Derive the expression for the principal stresses and the maximum shear stress for a member subjected to simple shear stress. Show the locations of Principal Planes and Planes of Maximum shear stress. **[9]**

b) At a point in a strained material the principal stresses are 140N/mm² (tensile) and 60 N/mm² (compressive). Determine the normal stress, shear stress and the resultant stress on a plane inclined at 45°to axis of major Principal stress. What is the intensity of maximum shear stress at the point? **[9]**

OR

b) An I-section beam 350mm ×150mm has a wed thickness of 10mm and a flange thickness of 20mm.(Fig.4) If the shear force acting on the section is 40 kN, find the maximum shear stress developed in the I-section. Also sketch the shear stress distribution across the section. **[9]**

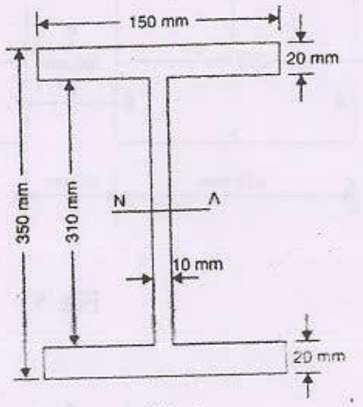


Fig.4

Q5) a) Derive the expression for slope and deflection of a simply supported beam subjected to an UDL for the whole span, using double integration method. **[8]**

Seat No.

S.E. (Mechanical Engineering) (Semester - III) (Revised)
Examination, November - 2017
FLUID MECHANICS
Sub. Code : 63354

Day and Date : Thursday, 23 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Neat diagrams must be drawn wherever necessary.**
3) **Figures to the right indicate full marks.**
4) **Use of non programmable calculator is allowed.**
5) **Assume suitable data if necessary.**

Q1) a) Define viscosity, surface tension and capillarity and write their units in S.I. system. **[6]**

b) A thin square plate 1m × 1m is placed horizontally at the centre in a horizontal gap of height 2 cm filled with oil of viscosity 10 poise. The plate is pulled at a constant velocity of 0.1 m/s. Find the force on the plate.

If the gap is now filled with another oil. When the plate is placed at a distance of 0.5 cm from one of the surfaces of the gap and pulled with the same velocity, if the force on the plate remains same as before, find the viscosity of the new oil. **[6]**

c) Define Buoyancy and meta centre. **[4]**

Q2) a) Distinguish by giving examples, Laminar and Turbulent flow, Steady and Unsteady flow, Uniform and Non uniform flow and Compressible and Incompressible flow. **[8]**

b) Solve any one of the following : **[8]**

i) Find the value of a such that the flow field given by

$V = (axy - z^3)i + (a - 2)x^2j + (1 - a)xz^2k$ is irrotational.

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ii) An air plane flies at an altitude where the pressure and density of air are 40 KN/m² and 0.58 Kg/m³ respectively. If the stagnation pressure measured by a pitot tube is 57 KN/m², compute the speed of the aeroplane and the stagnation temperature and stagnation density. Take R = 287J/Kgk and ratio of specific heats is 1.4.

3) a) i) Bernoulli's theorem is based on which principle? Give its statement. Name three devices where Bernoulli's equation is applied. [4]

ii) Derive an expression for discharge over a triangular notch in terms of head of liquid over the crest of the notch and the included angle. [5]

b) Solve any one of the following : [9]

i) A venturimeter is used for the measurement of discharge of water in a horizontal pipeline. The pipe diameter is 20 cm and the throat diameter is 12 cm. When the flow of 130 lit/sec is flowing, the attached manometer shows a head difference of 50 cm if the coefficient of discharge of the venturimeter is 0.98 find the density of manometric fluid in the manometer.

ii) A circular tank of diameter 3 mt contains water up to a height of 4 mt. If the water is discharged through a 10 cm diameter orifice at the bottom of the tank, find the height of water above the orifice after 5 minutes Assume coefficient of discharge of orifice is 0.63.

4) a) i) Discuss the applications of momentum equation. [4]

ii) Explain with a neat sketch how pitot tube is used to measure discharge through pipe. [4]

b) An oil of viscosity 9 poise and specific gravity 0.9 is flowing through a horizontal pipe of 60 mm diameter. If the pressure drop in 100 mt. length of the pipe is 1800 KN/m² determine [8]

i) Wall shear stress and frictional drag for 100 mt. length.

ii) Power required to maintain the flow.

iii) The velocity gradient at the pipe wall.

iv) The velocity and shear stress at 8 mm from the wall.

5) a) i) Explain the concept of equivalent pipe. [5]

ii) Discuss the causes of minor energy losses in flow through pipes. [4]

b) Solve any one of the following : [9]

i) Three pipes of diameters 30 cm, 20 cm and 40 cm and lengths 450 mt, 255 mt and 315 mt respectively are connected in series. The difference in water surface levels in two tanks is 18 mt. Determine the rate of flow of water if coefficients of friction are 0.0075, 0.0078 and 0.0072 respectively considering

A) Minor losses also B) Neglecting minor losses.

ii) A horizontal pipe line 15 cm in diameter is joined by sudden enlargement to 25 cm diameter pipe. Measurements indicate that when flow is from smaller to larger cross section the head loss is 0.5 mt in excess of that when the flow takes place from larger to smaller section. Determine flow rate. Take coefficient of contraction $C_c = 0.63$.

6) a) What do you mean by boundary layer separation? Why does it occur? With neat sketches explain the methods used to control the separation of boundary layer. [8]

b) Solve any one of the following : [8]

i) A geometrically similar model of an air duct is built to 1 : 25 scale and tested with water which is 50 times more viscous and 800 times denser than air. When tested under dynamically similar conditions the pressure drop is 2 bar in the model. Find the corresponding pressure drop in the full scale prototype.

ii) Define pressure drag and skin drag or shear drag. A 2.5 mt long body having a projected area of 2.4 m² normal to the direction of motion is having a viscosity of 0.0012 Ns/m². Find the drag on the body if it has drag coefficient of 0.45 for Reynolds number of 7×10^6.

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Total No. of Pages : 3

Seat No.	

S.E. (Mech) (Part - II) (Semester-III) (Revised)
Examination, November - 2017
METALLURGY
Sub. Code : 63353

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any three questions from each section.**
2) **Answers for both sections to be written in the same answer book.**
3) **Figures to the right indicate full marks.**
4) **Draw neat figures wherever necessary.**

SECTION-I

Q1) Answer any three of the following. Each question carries equal marks. **[18]**

a) With neat sketches. Explain the process of Solidification by nucleation, crystallization and growth.

b) Explain the phenomenon of coring using equilibrium diagram? How can be cored structures avoided or eliminated?

c) Draw a typical equilibrium diagram for impure/ partial eutectic systems and explain the cooling and solidification of any hypoeutectic alloy from above melting temperature to room temperature and draw the room temperature structure.

d) Draw the crystal structures of BCC and FCC and evaluate the number of atoms per unit cell for both.

Q2) a) Draw Fe-Fe_3C equilibrium diagram. Indicate all the phases. Temperatures and Compositions. **[8]**

b) What is SG Iron? Explain the process of manufacturing SG Iron. Draw the microstructure of SG iron and Gray Cast iron and compare their properties. **[8]**

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Q3) a) Draw typical equilibrium diagram of A1-Cu alloy system? Explain the process of precipitation hardening treatment and its effects. Write the applications. [7]

b) Draw self explanatory sketches of any three. [9]

i) Substitutional and interstitial type solid solution.

ii) Microstructure of white and malleable cast irons.

iii) Microstructure of 0.4 and 1.2% carbon steel .

iv) Microstructure of 70:30 brass as cast and annealed

v) X-ray Radiography.

vi) SN curve and Creep curve.

Q4) Write short notes on any four. [16]

a) Solid solutions.

b) Tool steels.

c) Ferritic Stainless steels.

d) Dye Penetrant Testing.

e) Impact Testing.

SECTION-II

)5) a) Draw flowchart for carbide cutting tools manufactured by powder metallurgy techniques, why pre-sintering is necessary in such tools? [9]

b) Classify different types of heat treatment furnaces? Explain rotary hearth furnace with neat sketch? [9]

6) a) Explain precipitation in A1–Cu alloys with respect to composition, aging time and temperature, over-aging? [8]

b) Classify case carburizing methods? Explain pack carburizing with neat sketch. [8]

Q7) Differentiate clearly between any four of the following. [16]

a) Hardening and Tempering.

b) Flame and Induction hardening.

c) TTT and CCT curves.

d) Pearlite and ferrite.

e) Annealing and normalizing.

Q8) Write short notes on any four of the following. [16]

a) Liquid phase sintering.

b) Induction hardening.

c) heat treatment defects.

d) Bainitic transformation.

e) Self lubricating bearing.

✡ ✡ ✡

)6) a) Define the following as related to steam turbine. [8]

i) Speed ratio

ii) Blade velocity coefficient

iii) Diagram efficiency

iv) Stage efficiency

OR

Explain the pressure compounding of impulse turbine showing pressure and velocity variations along the axis of the turbine.

b) The following particulars refer to a stage of a Parson's turbine comprising one ring of fixed blades and one ring of moving blades.

Mean diam. of blade ring = 70 cm

Speed of turbine = 3000 rpm

Steam velocity at exit from blade = 160 m/s

Blade outlet angle = 20°

Steam flow rate = 7 kg/s

Draw velocity diagram & find

i) Blade inlet angle

ii) Tangential force

iii) Power developed

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Total No. of Pages : 4

Seat No.

S.E. (Mech.) (Part - II) (Semester - III) Examination, November - 2017

APPLIED THERMODYNAMICS

Sub. Code: 63352

)ay and Date :Wednesday, 15 - 11- 2017 Total Marks : 100

'ime :10.00 a.m. to 1.00 p.m.

nstructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.
4) Draw neat sketch wherever necessary.
5) Use of steam table, mollier chart and non-programmable calculator is allowed.

)1) a) State and prove Carnot Principle. [8]

OR

b) Prove that Entropy of an isolated system during a process always increases. [8]

c) An insulated cylinder of volume capacity 4 m^3 contains 20 kg of nitrogen. Paddle work is done on the gas by stirring it till the pressure in the vessel gets increased from 4 bar to 8 bar. Determine change in entropy. Take for nitrogen C_p = 1.04 kJ/kgK and C_v = 0.7432 kJ/kgK. [8]

Q2) a) Write a note on steam tables and Mollier chart. [8]

OR

b) Write a note on Reheat and Regenerative steam power cycles. [8]

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c) A steam turbine receives steam at a pressure of 20 bar and superheated to 87.6°C. The exhaust pressure is 0.07 bar and the expansion of steam takes place isentropically. Calculate following using steam table **[10]**

i) Heat supplied

ii) Heat rejected

iii) Net work done

iv) Thermal efficiency

v) SSC.

3) a) Classify boilers. Compare water tube boilers with fire tube boilers. **[8]**

OR

b) What is function of air pump in condenser? Explain with neat sketch working of Edward's air pump. **[8]**

c) A prime mover uses 15,000 kg of steam per hour develops 2450 kW. The steam is supplied at 30 bar and 350°C. The exhaust from the prime mover is condensed at 725 mm of Hg when barometer reads 755 mm of Hg. The condensate temperature from the condenser is 31°C and the rise in circulating water temperature is 10°C. Determine: **[8]**

i) The quality of steam entering the condenser.

ii) The quantity of circulating water required.

iii) Cooling ratio.

Assume that no air is present in the condenser.

4) a) What is the function of the nozzle? Describe different types of steam nozzles with suitable sketch. **[8]**

OR

b) Explain the terms, degree of under cooling and degree of super saturation. What are the effects of supersaturation? **[8]**

c) Steam at a pressure of 15 bar and dryness fraction 0.97 is discharged through a convergent- divergent nozzle to a back pressure of 0.2 bar. The mass flow rate is 9 kg/kwh. If the power developed is 220 kW. Determine **[8]**

i) Throat pressure.

ii) Number of nozzles required if each nozzle has a throat of rectangular cross section of 4 mm × 8 mm.

5) a) Classify the turbines and compare impulse turbine with reaction turbine. **[8]**

b) A impulse turbine has exit steam velocity from a nozzle equal to 900 m/s. The nozzle makes an angle of 20° to the tangent of the rotating wheel. The main blade speed is 300 m/s. The blades are equiangular. The mass of steam flowing through the turbine is 1200 kg/hr. Calculate **[9]**

i) The blade angles.

ii) The blade efficiency.

iii) The power developed.

Take blade velocity co-efficient = 0.85.

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Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Semester - III)
Examination, November - 2017
ELECTRICAL TECHNOLOGY
Sub. Code : 63351

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate marks.**
3) **Draw neat figures wherever necessary**
4) **Assume suitable data, if missing. State it clearly.**

SECTION - I

Q1) a) Derive the expression for speed and torque of dc motor. **[1 × 8]**

OR

Draw circuit diagrams and torque speed characteristics of dc shunt motor, dc series motor and dc cumulative compound motor.

Answer any two of the following (b, c, d). **[2 × 6]**

b) Draw the diagram and explain the working of 4 point starter.

c) Explain the basic methods of electric braking of dc motor.

d) A DC series motor runs at 1200 rpm driving a constant torque load by taking 10 A current from 200V supply. Now 5 ohm resistance is connected in series with the motor. Find the new armature current and new speed. The armature resistance is 0.6 ohm. Field resistance is 0.5 ohm.

Q2) Answer any TWO **[2 × 8]**

a) State three advantages of using 3 phase induction motor rather than dc motor. Describe the construction of cage type rotor.

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b) Torque of 3 phase induction motor is given by $\frac{120\, s\, E_2^2\, R_2}{2\pi N_s \left(R_2^2 + S^2\, X_2^2\right)}$

where E_2 ,R_2, X_2 , s, N_s are rotor induced emf per phase at standstill, Rotor resistance per phase, Rotor reactance per phase at standstill, slip and synchronous speed respectively. Write the value of slip and expression for torque at

i) Starting

ii) When the torque is maximum

iii) If rotor speed=Synchronus speed.

c) A 4 pole, 230V, 50Hz, 3 phase induction motor draws 10A at ( ) pf while running at 1450rpm. The stator loss is 100W, frictional loss is 100W. Find the rotor Cu loss. Neglect the rotor iron loss and find efficiency of the motor.

Q3) Answer any TWO **[2 × 8]**

a) Why DOL starter should be used for small rating motors? Describe DOL starter for 3 phase induction motor.

b) Describe rotor side speed control methods of 3 phase induction motor.

c) Explain the 'constant v/f' speed control method. Why it is the most popular method these days?

SECTION - II

Q4) Answer any TWO **[2 × 8]**

a) What are the desirable properties of servo motor? Describe methods of controlling dc servo motor.

b) Describe a linear induction motor. State its applications.

c) State advantages of brushless dc motor over conventional de motor. How is commutation obtained in BLDC motor?

Q5) Answer any TWO **[2 × 8]**

a) Explain the factors to be considered for selecting a motor for a particular drive.

b) Explain with examples the terms- active load, passive load, multimotor drive.

c) Classify mechanical loads based on how the torque requirement changes with driving speed. Explain.

Q6) Answer any TWO **[2 × 8]**

a) Compare direct arc type furnace with indirect arc furnace in all aspects.

b) Describe the set up and operation for eddy current heat treatment of metallic parts.

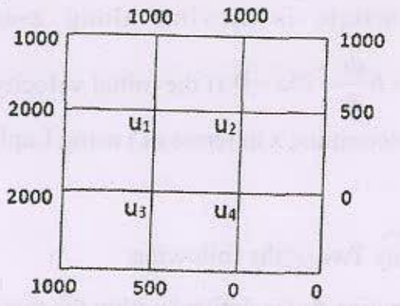
c) A 200 kW resistance oven is to be operated in such a way that its maximum temperature is not to exceed 1700°C. The initial temperature of the charge is 420°C. If heating element is a wire of diameter 0.6 cm is used, find the length required. Also find resistance of heating element.

Radiating efficiency =0.5, Emissivity = 0.5, Specific resistance of heating element= 150×10^{-6} ohm-cm.

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iv) $u(x, \infty)$ is finite

b) Solve the Laplace equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown in figure by Gauss-Siedal iterative method by per. [16]



Total No. of Pages : 4

Seat No.

S.E. (Mechanical Engg.) (Semester - III) (Revised) Examination, November - 2017

ENGINEERING MATHEMATICS - III

Sub. Code : 63350

Day and Date : Friday, 10 - 11 - 2017 Total Marks : 100

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.
4) Assume suitable data if necessary.

SECTION - I

Q1) Attempt any Three of the following.

a) Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 3\sin x + 4\cos x$ with $y(0) = 1$ and $y'(0) = 0$. [6]

b) Solve $(D^2 + D+1)y = (1- e^x)^2$ [6]

c) Solve $(D^2 +5D + 4)\, y = 3 - 2x$ [6]

d) Solve $x^2\frac{d^2y}{dx^2} + 4x\frac{dy}{dx} + 2y = e^x$. [6]

Q2) Attempt any one of the following.

a) The whirling speed of a shaft of length l is given by $\frac{d^4y}{dx^4} - a^4y = 0$,

where $a^4 = \frac{Ww^2}{gEI}$ and y is the displacement at distance x from one end. If the ends of the shafts are considered in long bearing so that the slope at each end is zero, show that the shaft will whirl when cos al cosh al =1. [16]

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b) i) The motion of particle is given by $\frac{d^2s}{dt^2}+k^2\frac{ds}{dt}=0$. At $t = 0$, $s=s_0$ and $\frac{ds}{dt}=v_0$ show that as time $t\to\infty, s=s_0+\frac{v_0}{k^2}$ **[8]**

ii) A spring for which stiffness K = 700 Newton / m hangs in a vertical position with its upper end fixed. A mass of 7 kg is attached to the lower end. After coming to rest, the mass is pulled down to 0.05 m and released Discuss the resulting motion of the mass, neglecting air resistance. **[8]**

Q3) Attempt any two of the following.

a) If $\vec{a}$ is a constant vector, $\vec{r}=x\vec{i}+y\vec{j}+z\vec{k}$ and $r=\sqrt{x^2+y^2+z^2}$ then find

i) $\nabla.\left(\frac{\vec{a}\times\vec{r}}{r}\right)$ and show that ii) $\nabla r^n=nr^{n-2}\vec{r}$ **[8]**

b) Show that $\vec{F}=(z^2+2x+3y)\vec{i}+(3x+2y+z)\vec{j}+(y+2xz)\vec{k}$ is irrotational but not solenoidal and hence find scalar potential **[8]**

c) Find the directional derivative of $\phi=x^2+2y^2-3z^2$ at (1, 2, 1) in the direction **[8]**

i) Normal to $xy^2+yz^3=4$ at (1, –1, 1)

ii) tangent to $x=t^2+t, y=2t, z=2-t$ at $t=1$

SECTION - II

Q4) Attempt any three from the following:

a) Find the Laplace transform of $\frac{d}{dt}\left(\frac{\sin t}{t}\right)$ **[6]**

b) Find $L\left\{\int_0^t x\cosh x dx\right\}$ **[6]**

c) Find inverse Laplace transform of $\log\left(1+\frac{a^2}{s^2}\right)$ **[6]**

d) A particle is moving along x-axis according to the law $\frac{d^2x}{dt^2}+6\frac{dx}{dt}+25x=0$. If the initial velocity is 12 meters per second to the left, determine x in terms of t using Laplace transform method. **[6]**

Q5) Attempt any Two of the following:

a) A function $f(x)$ is defined within the range $(0, 2\pi)$ as **[8]**

$$f(x)=\begin{cases}x & \text{if } 0<x<\pi\\ 2\pi-x & \text{if } \pi<x<2\pi\end{cases}$$

Express f(x) as a Fourier series in the range $(0, 2\pi)$

b) Find Fourier series with period 3 to represent $f(x) = 2x - x^2$ in the range $(0, 3)$ **[8]**

c) Find half range cosine series for $f(x) = \sin x$ in the range $(0, \pi)$ and hence deduce that $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots\ldots=\frac{\pi}{4}$. **[8]**

Q6) Attempt any one from the following.

a) Solve $\frac{\partial u}{\partial t}=a^2\frac{\partial^2 u}{\partial x^2}$ if $u(x, t)$ satisfies the following conditions. **[16]**

i) $u(0, t) = 0$ for all t

ii) $u(l, t) = 0$ for all t

iii) $u(x,0)=\begin{cases}x & \text{if } 0\le x\le l/2\\ l-x & \text{if } l/2\le x\le l\end{cases}$

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VII) (Old)

Examination, November - 2017

EARTHQUAKE ENGINEERING

Sub. Code: 47903

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :

1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data whenever necessary.**
4) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION-I

Q1) a) What are causes of earthquake? Explain in brief plate tectonic theory. **[8]**

b) Classify and describe with suitable sketches, different types of seismic waves generated by an earthquake. **[8]**

Q2) a) Define Logarithmic decrement, how it is measured and derive the equation of Logarithmic decrement. **[7]**

b) The building frame shown in the Fig.1 is given a 100 mm lateral displacement and released from the rest to vibrate freely. Find the logrithmatic decrement and displacement of the system afte 12 cycles and comments on the result. Consider 10% damping. Take $EI_{column} = 1.1 \times 10^{12}$Nmm. **[9]**

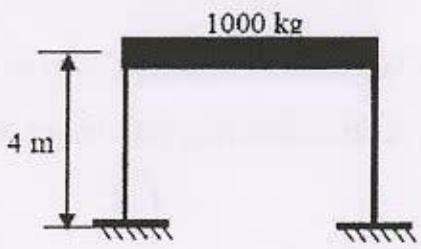


Fig. 1

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Q3) a) Explain in details Force Transmission Ratio. **[05]**

b) A SDOF system consists fo 5 m high column of 600 mm diameter which supports the heavy mass of 10500 kg at its top. The system is subjected to a harmonic force of 1800 sin50t N. Consider 20% damping and E = 2×10^5. Calculate the maximum dynamic amplitude and also state whether the system will have resonance or not? **[11]**

Q4) Calculate the base shear for a five storey hospital building having special moment resisting frame (SMRF) located in Pune on medium soil with following data using seismic coefficient method. **[18]**

a) No. of bay in x and y-direction = 4

b) Width of each bay = 5m

c) Thickness of slab = 150 mm

d) Storey height = 3.2 m

e) Size of beam and column = 300 mm × 450 mm

f) Amount of damping = 5% of critical damping

g) Live load = 4kN/m^2

Assume any additional data if required and neglect the weight of the infill wall panels.

SECTION-II

Q5) a) Explain earthquake design philosophy for building. **[8]**

b) Explain soft storey? Explain how soft storey probelms can be eliminated in the existing buildings. **[8]**

Q6) a) Explain how "ductility of building" can be effectively designed. **[8]**

b) What are the ductile detailing provisions for column? Explain with neat sketches. **[8]**

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Q7) a) What points should be kept in mind while designing earthquake resistant brick masonry structure? **[8]**

b) Discuss in detail the advantage of horizontal bands and vertical reinforcement in the masonry buildings. **[8]**

Q8) Write a short note (Any three): **[18]**

a) Stud Wall Construction.

b) Strong column and weak beam.

c) Effect of soft storey of RC structure.

d) Jacketing of column.

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Seat No.	

Total No. of Pages : 2

B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

SOLID WASTE MANAGEMENT (Elective-I)

Sub. Code : 67569

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any two of the following: **[2×8=16]**

a) What is Solid Waste and Solid Waste Management? Write the objectives of SWM.

b) State the composition of MSW. Describe the compositions.

c) Write note on Biomedical Waste Management.

Q2) Answer any two of the following: **[2×9=18]**

a) Explain with the help of flow diagram, the functional elements of Municipal Solid Waste Management.

b) Explain the methods of solid waste collection with a neat sketch.

c) Explain in detail with help of figure the different types of Transfer Station.

Q3) Answer any two of the following: **[2×8=16]**

a) List out the different equipment used for processing solid waste and explain any one with neat sketch.

b) What is MRF? Explain the processes for MSW at these facilities with flow diagram.

c) Explain with the figure the different types of air classifiers methods.

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SECTION-II

Q4) Answer any two of the following: **[2×9=18]**

a) What is Sanitary landfilling? Write the site selection criteria for sanitary landfilling.

b) Draw the cross section of sanitary landfill and explain the essential components.

c) Identify the adverse effects of a landfill leachate and its appropriate control measures.

Q5) Answer any two of the following: **[2×8=16]**

a) What is composting? Explain composting process of bio degradable MSW.

b) Explain mechanical composting plant with flow diagram.

c) Explain the different factors affecting composting.

Q6) Answer any two of the following: **[2×8=16]**

a) Explain the working of an incinerator with a neat sketch.

b) Write the air pollution problem associated with incineration system and its control techniques.

c) Describe pyrolysis and its products.

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Total No. of Pages : 2

Seat No.	

B.E. (Civil) (Semester-VII) Examination, November - 2017
GROUND IMPROVEMENT TECHNIQUES (Elective-I)
Sub. Code : 67571

Day and Date : Thursday, 23-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Que. No. 1 from section-I and Que. No. 5 from section-II are compulsory.**
2) **Solve any two other questions from each of the section.**
3) **Figures to the right indicates full marks.**

SECTION-I

Q1) Answer the following: **[4×5=20]**

a) Explain the various types of vertical drains used in ground improvement.

b) What is mean by dynamic consolidation.

c) Explain use of stone column as ground improvement method.

d) Enlist various ground improvement technique according to their suitability.

Q2) a) How do vertical drains improve the functioning of pre-loading? Explain with neat sketch. **[8]**

b) Explain various components of ground Anchor. **[7]**

Q3) a) Explain design procedure of stone column. **[8]**

b) Explain construction sequence of soil nailing. **[7]**

Q4) Write a short note on **[3×5]**

a) Classification of ground improvement technique

b) Soil nailing

c) Rock Anchor in grannuar soil

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SECTION-II

Q5) Answer the following: **[4×5=20]**

a) Enlist various factor affecting the soil stabilization.

b) Explain the earth reinforcement mechanism.

c) Write down the various application of earth reinforcement.

d) Enlist different types of geosynthetics.

Q6) a) Compare and enlist the various method of soil stabilization. **[8]**

b) Explain the various application of geosynthetics with respect to

i) reinforcement ii) separator

iii) filter iv) drainage **[7]**

Q7) a) Explain the stress-strain relationship of reinforced soil. **[8]**

b) Explain the various types of grout used in ground improvement. **[7]**

Q8) Write a short note on: **[5×3]**

a) Function of geosynthetics

b) Fly-ash soil stabilization

c) Selection of geosynthetics



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Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Part - IV) (Semester - VIII)
Examination, November - 2017
DESIGN OF CONCRETE STRUCTURES - II
Sub. Code : 67748

Day and Date : Wednesday, 1 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary and mention it clearly.**
4) **Use of non programmable calculator is allowed.**
5) **Use of relevant IS Codes are allowed.**

SECTION - I

Q1) Design rectangular beam for limit state of collapse in torsion for following data. **[16]**

Size of beam = 400 × 700mm, over all

Factored Shear force = 95 KN

Factored Bending moment = 180 KN.m

Factored Torsion Moment = 55 KN.m

Effective cover = 50mm

Use M20 and Fe 415

Q2) A RCC beam ABCD spanning over four supports carries a live load of 12KN/m and dead load from walls 300mm, 2.8 high. If M20 grade concrete and Fe 415 grade steel is to be used. Design the continuous beam using IS-456 - 2000 provision. Span AB = BC = CD = 6m Take unit weight brick wall 19KN/m^3. Draw a sketch showing reinforcement details. **[16]**

Q3) Design a square water tank resting on ground having dimensions 4m × 4m and height of water is 3m. Assume free board of 0.2m. Use M20 and Fe 415 grades. **[16]**

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Q4) a) Write a note on balanced, under reinforced and over reinforced section as per WSM. **[9]**

b) Explain the concept of moment of redistribution. **[9]**

SECTION - II

Q5) a) Explain in details three concepts of pre-stress concrete section in analysis. **[8]**

b) Explain systems of pre-stressing with figures. **[8]**

Q6) A pre-stressed concrete beam of rectangular section 300mm × 600mm has a span of 10m. The effective pre-stressing force is 980KN at constant eccentricity of 120mm. The dead load of beam is 4.5KN/m and the beam has to carry a live load of 7.5KN/m **[16]**

Determine the extreme stresses,

a) At the end section

b) At the midsection without action of live load

c) At mid section with action of live load.

Q7) A post tensioned pre-stressed concrete beam of 16m span is subjected to an initial pre-stress of 1458KN. The profile of the cable is parabolic with the maximum eccentricity of 520mm at the center of span. **[16]**

$A = 2.42 \times 10^5 mm^2$, $I = 5.30 \times 10^{10} mm^4$, $As = 1386 mm^2$,

$Es = 2.1 \times 10^5 N/mm^2$, $Ec = 3.82 \times 10^4 N/mm^2$

$\mu = 0.25$, $k = 0.0015/m$, anchorage slip = 2.5mm, creep coefficient = 1.5, $\alpha = 0.13$

Determine the following losses in pre-stress,

a) Elastic shortening.

b) Shrinkage in concrete.

c) Creep in concrete.

d) Slip in anchorage.

e) Frictional loss.

Q8) Design a pre-tensioned concrete rectangular section for the following details

Effective span of beam = 12m.

Live load of intensity = 30 KN/m.

Concrete grade = M 35

Ultimate stresses tendon = 1450 N/mm^2

Loss of pre-stress = 20%

Assume Safe stress is 0.6 times Ultimate stress in tendon.

Permissible stress in concrete at transfer stage is 0.5 σ_{CK}

Permissible stress in concrete at working stage is 0.4 σ_{CK}

Permissible tensile stress in concrete at transfer and working stage is 1.2 N/mm^2 **[18]**

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Total No. of Pages :3

Seat No.	

B.E. (Civil Engineering) (Semester - VIII)
Examination, November - 2017
STRUCTURAL DESIGN OF FOUNDATION AND RETAINING STRUCTURES (Elective - II)
Sub. Code: 67753

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Solve any two questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Use of IS 456- 2000 is allowed.**
4) **Assume suitable data if necessary and mention it clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Two columns A and B 5 m apart between centres carry loads 840 kN and 1200 kN. Design a 2 m wide combined rectangular footing for the columns. The footing shall consist of a central longitudinal beam with cantilevering slabs on either side. Each column is 400 mm × 400mm. The safe bearing capacity of soil is 150 kN/m^2. Use M 20 grade concrete and Fe 415 steel.**[25]**

Q2) A column carrying a load of 2500 kN has to be supported on 4 piles each of size 300 mm × 300 mm. The piles are spaced at 1.00 m centres as shown in figure.1. The column size is 600 mm × 600 mm. Design the pile cap. Use M 20 grade concrete and Fe 415 steel. **[25]**

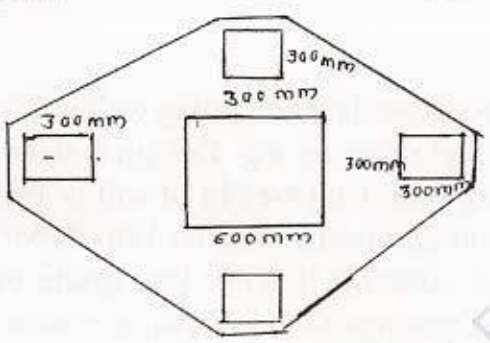


Fig. 1

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Q3) Design a suitable continuous raft foundation connecting the columns of a building 12 m × 12 m shown in figure to suit the following data. **[25]**

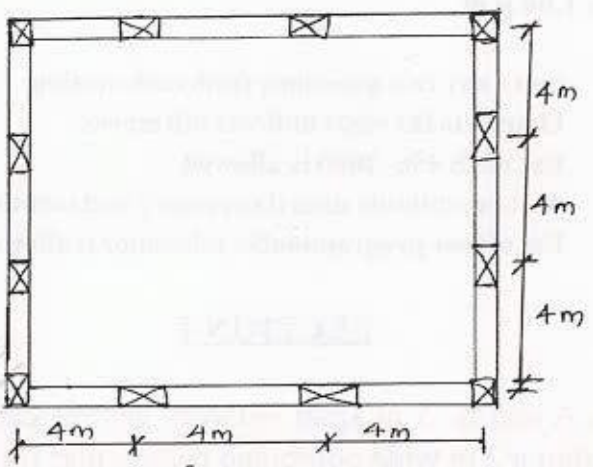
a) Spacing of column = 4 m C/C

b) Service load transmitted = 500 kN on each column.

c) Size of column = 300 mm × 300 mm.

d) Safe bearing capacity = 150 kN/m^2.

e) M 20 concrete and Fe 415 steel.



figure

SECTION-II

Q4) a) Draw neat sketch of well foundation and explain function of each component part in detail. **[12]**

b) Enlist different types of well foundation explain each in detail wiht neat sketch. **[13]**

Q5) A steam of cantilever retaining wall is 3.8m tall, The cantilever retaining wall retains soil up to its top. Design a steam, toe and heel slab of a cantilever retaining wall. Unit weight of soil is 19KN/M^3. The angle of repose is 30°. Safe bearing capacity of soil is 180KN/M^2. The coefficient of friction between soil and concrete is 0.60. Use grade of concrete M_{20} and grade of steel Fe 415. Draw neat sketch showing reinforcement details of cantilever retaining wall. **[25]**

Q6) a) Explain breakwater and its application? Draw a neat sketch and explain vertical wall break water. **[12]**

b) Design armor of rubble mound breakwater if depth of water is 17.0m. Wind velocity is 165Km/Hour. Fetch of wave is 260KM. Allowable bearing pressure on rock is 800KN/M^2. **[13]**

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b) Differentiate between free hold property and lease hold property. [5]

c) Write the significance of sinking fund and derive its expression. [5]

Q8) Write short note on (any three): [18]

a) Building lease and occupational lease.

b) Valuer and his duties.

c) Different types of values.

d) Arbitration.

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Total No. of Pages :4

Seat No.	

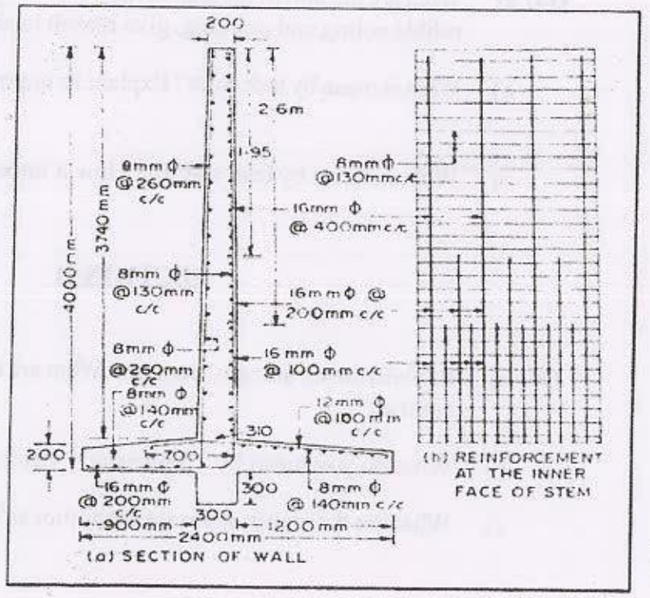
B.E. (Civil) (Semester - VII) (New Course)
Examination, November - 2017
QUANTITY SURVEYING & VALUATION
Sub. Code: 67560

Day and Date :Wednesday, 15 - 11- 2017 **Total Marks : 100**
Time :2.30 p.m. to 6.30 p.m.

Instructions :
1) **Q.No. 1 is compulsory.**
2) **Attempt any two questions from remaining questions of section I.**
3) **Attempt any three questions from section II.**
4) **Assume any other additional data if required and state it clearly.**

SECTION-I

Q1) Work out the quantities of below retaining wall 50m in length as stated. **[20]**



P.T.O.

a) Calculate concrete quantity in standard format.

b) Prepare a BBS of given figure in standard format.

Q2) a) Write different types of estimate and state various items to be included in it. **[5]**

b) What is DSR? Prepare analysis of rate for a RCC isolated box footing of area 2.5Ssq.M, and 3.1Sq.M each for a concrete depth 350mm. **[10]**

Q3) a) Which are the various extra charges taken in to account for preparing detailed estimate and why? Explain in detail. **[8]**

b) Write unit of measurement of any three civil engineering items. Write mode of measurement for excavation and concrete. **[7]**

Q4) a) What are the unit of measurement for skirting, door handle, steel sections, rubble soling and pointing, give reason in short. **[5]**

b) What is mean by task work? Explain its importance with suitable example. **[5]**

c) What is mean by lead and lift? How it impacts the cost? **[5]**

SECTION-II

Q5) a) Explain the meaning of contract. What are the reasons of for rejection of contract? **[7]**

b) What do you mean by "Tendering"? Draft a sample tender notice. **[5]**

c) What are the rights and responsibilities of parties of contract. **[5]**

Q6) a) Explain valuation by development method. **[6]**

b) A plot shown in figure is to be valued according to the following details: **[10]**

i) Front width is 50m

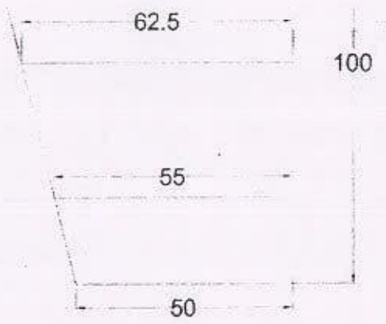
ii) Rear width is 75m

iii) Initial depth is 20m

iv) Market rate of land in the same locality is Rs. 375psm.

Use belting method of valuation.

75



Q7) a) A plate compactor was purchased at Rs. 80,000/-. Assume salvage value to be 10% after 8 years, Calculate depreciation for every year by following methods: **[6]**

i) Straight line method

ii) Constant percentage method.

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Total No. of Pages : 3

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B.E. (Civil) (Semester-VII) (Revised) Examination, November - 2017

PROJECT MANAGEMENT AND CONSTRUCTION EQUIPMENT

Sub. Code : 67561

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt any THREE questions from each Section.**
2) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain the role of various agencies involved in a construction project. **[8]**

b) A project consists of following activities with their duration in days. **[9]**

Activity	1-2	1-3	1-4	2-5	3-6	4-5	4-6	4-7	5-7	6-7
Duration (days)	6	3	4	0	4	12	10	8	5	6

Draw the network. Find out critical path and project duration.

Following conditions exists at the end of 10^{th} day,

i) Activities 1-2, 1-3, 1-4 have been completed as per schedule.

ii) Activities 4-5, 4-6, 3-6 are in progress and will require 6,6 and 1 more days for its completion, respectively.

iii) Other activities have not been started and their duration holds good except activity 5-7 which will require only 3 days instead of 5 days as planned originally.

Update the network.

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P.T.O.

)2) a) Explain the concept of Normal and Beta Distribution in P.E.R.T. [8]

b) With the information given in the table draw the network for a construction project. Determine the critical path and its standard deviation. Find Probability of completion of project in 40 days. (For Z = 1.7, Pr. = 95.54%; For Z = 1.8, Pr. = 96.41%) [9]

Activity	Optimistic time	Most likely time	Pessimistic time
1-2	2	5	8
2-3	8	11	20
3-4	0	0	0
2-4	4	7	16
2-5	4	9	20
4-6	7	10	13
5-6	3	7	17
3-7	3	5	13
6-7	2	3	10
7-8	2	4	6

)3) a) Explain various safety equipment used on construction sites. [8]

b) What are the common risks on construction projects? How will you identify these risks? [9]

)4) Write notes on any FOUR. [16]

a) Objectives of Project Management.

b) Milestone Chart.

c) Resource Allocation.

d) Safety Policy.

e) Safety Training.

SECTION-II

)5) a) Explain the construction and operation of Bulldozer with neat sketch. [8]

b) Explain working of Scraper with neat sketch. [8]

)6) a) Explain the construction and working of 'Clamshell'. [8]

b) Enlist various types of compacting equipment. Explain any ONE with sketch. [9]

)7) a) Explain the 'safety measures' in blasting operations. [8]

b) Explain in detail 'Well Point System' of dewatering with neat sketches. [9]

)8) Write notes on any FOUR. [16]

a) Mechanical v/s Manual Construction.

b) Use of Tractors in construction.

c) Tippers.

d) Detonators.

e) Necessity of drainage in excavations.

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Total No. of Pages : 3

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B.E. (Civil Engineering) (Semester - VII)
Examination, November - 2017
EARTHQUAKE ENGINEERING (New)
Sub. Code : 67559

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Assume any suitable data whenever necessary.**
3) **Use of non-programmable calculator and I.S. 1893: 2002 (Part I) are allowed.**

SECTION - I

Q1) a) What is mean by plate boundaries? Explain in details. **[8]**

b) Classify ad describe with suitable sketches, different types of waves generated by an earthquake? **[8]**

Q2) a) Derive the equation of motion and its solution for free damped vibration system. **[8]**

b) Find the natural frequency and natural period for the building frame shown in the fig. 1. During test the frame is given 40 mm initial lateral displacement and released from the rest to vibrate freely. Find the displacement after 4 seconds and number of cycles when amplitude reduced to 1/20 of maximum.Consider 10% damping. Take $EI_{Column} = 1.5 \times 10^{12}$ N.mm^2, $EI_{Beam} = \infty$. **[10]**

OR

b) A SDOF system consists of 5 m high column of 450 mm diameter which supports the heavy mass of 20 tonne at its top. The system is subjected to a harmonic force of 200 Sin 40t kN. Consider 20% damping & $E = 2.1 \times 10^5$ N/mm^2. Calculate the maximum dynamic amplitude. Also, state whether system will have resonance or not? **[10]**

P.T.O.

Q3) Calculate base shear in the critical direction only for BSNL office in Pune with following data by seismic coefficient method. **[16]**

a) No. of storey = 4

b) No. of bay in x direction = 3

c) No. of bay in y direction = 1

d) storey height = 3 m

e) Width of each bay = 5 m

f) Total DL on roof = 12 kN/m^2

g) Total DL on floor = 10 kN/m^2

h) LL = 4 kN/m^2,

i) Thickness of slab = 120 mm

All columns having their longer side in X direction. Neglect weight of infill walls. Assume suitable data if required. Write all your assumptions & clauses of IS 1893 (2002). Building is provided with additional viscous dampers which will increase damping by 10%.

SECTION - II

Q4) a) Explain ductile detailing of beam as per IS 13920: 1993. Also give limitation of this code. **[10]**

b) Explain four virtue of good earthquake resistant design. **[8]**

OR

b) Explain soft storey & discuss its performance of soft storey building in past earthquakes. How will you avoid soft storey? **[8]**

Q5) a) Define the shear wall and its classification? Describe the structural behavior of shear wall? **[8]**

b) Draw the detailed sketch of **[8]**

i) Different ways of beam jacketing as IS code and.

ii) Different ways of columns as per IS code.

Q6) a) Explain in details concept of Friction Pendulum Bearings? **[8]**

b) Explain Tuned Liquid Dampers with its working principal? **[8]**

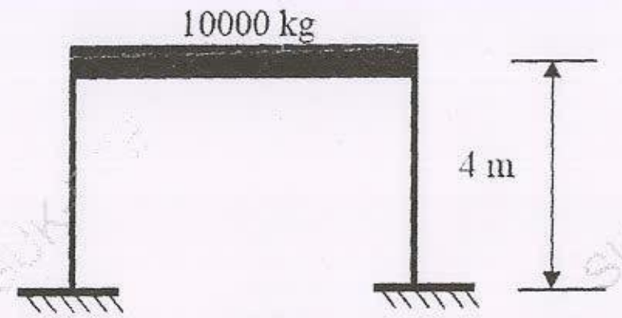


Fig 1.

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T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
GEOTECHNICAL ENGINEERING - II
Sub. Code: 66874

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Solve any three from following. **[18]**

a) Explain bore hole logging with sketch for soil and rock exploration.

b) List engineering properties of rock. Explain any one with method for determination.

c) Explain elastic settlement of shallow foundation.

d) List types of bearing capacity failure of soil. Explain any one with sketch.

Q2) Solve any two from following. **[16]**

a) Explain standard penetration test for determination of bearing capacity.

b) A plate load test was carried out on a ground having uniform sand strata up to sufficient depth. The size of the plate used was 30cm×30cm. Determine the bearing capacity and load that can be taken by a column foundation of size 1.2 m× 1.2 m in the above strata for an allowable settlement of 2 cm.

Load(kN)	4.5	9	18	27	36	45	54
Settlement (mm)	0.75	1.25	2.0	3.5	5.38	7.75	10.75

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P.T.O.

c) Write and explain equation of net ultimate bearing capacity of soil for general shear failure by IS code method with shape, depth, inclination of load and water table factor.

)3) Solve any two from following. **[16]**

a) Explain stepwise procedure for design of strap foundation with required equations and sketch.

b) Design a trapezoidal combined foundation for following data:

Column	Size	Load	Remark
A	0.50×0.50 m	2000kN	Column A is on boundary of plot.C/c distance between columns is 5.0 m.Safe bearing capacity of soil is 200kN/m²
B	0.30×0.30m	1500kN	

c) A rectangular foundation of 6.0 mt × 4.0 mt size carries a uniform load intensity 160kN/sq.m and is located at a depth of 1.5 m in a layer of clay having $E=4\times10^4$kN/sq.m and Poisson's ratio as 0.38. This clay layer underlain by second layer of silty soil having $E=7\times10^4$kN/sq.m and Poisson's ratio as 0.48. A hard strata lies below the second layer. Determine the elastic immediate settlement of the foundation.

SECTION-II

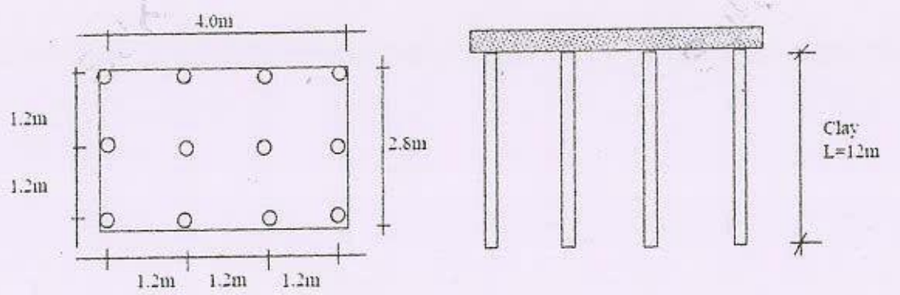
)4) Solve any three from following: **[18]**

a) What is group efficiency of pile group? Explain Feld's rule.

b) Explain with neat sketch under reamed pile and their uses.

c) A rectangular pile of section 0.60 m ×0.75 m and length 12 m penetrates a deposit of clay with c=42 kN/m². Assuming m=0.75, determine the magnitude of negative skin friction.

d) Find the allowable bearing capacity of a single pile in the group of piles given below, by using: Converse-Labarre Formula. Given data:- Diameter: 400mm,Cu=50kPa, $\gamma=18$kN/m³ F.S.=2.5



)5) Solve any two from following: **[16]**

a) Describe the methods of rectifying the tilt in the well during sinking operation.

b) Explain with fig. sand island method.

c) Write the different types and material used for sheet pile.

)6) Solve any two from following: **[16]**

a) Explain the friction circle method of slope stability analysis.

b) Name the techniques used in ground improvement and explain any one.

c) A slope 1 in 2 with a height of 8 m has the following properties of soil are Cu = 28 kN/m², angle of internal friction = 10° and unit weight of soil is 18 kN/m³, Stability Number = 0.064. Calculate factor of safety with respect to cohesion. What will be critical height of the slope in this soil?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (Revised) Examination, November - 2017
THEORY OF STRUCTURES
Sub. Code: 66873

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**
Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**
4) **Assume suitable data if necessary.**

SECTION-I

Q1) a) Explain in brief 'Static Indeterminacy of Structures'. **[5]**

b) Analyze the propped cantilever beam AB of 5m span, fixed at A and propped at B when subjected to a point load of 5kN at 3m from left end A. Take fixed end moment 'M_A' as a redundant. Also draw SFD and BMD. **[12]**

OR

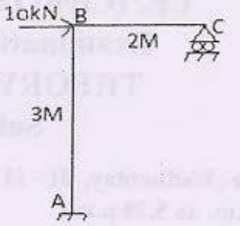
A fixed beam AB 5m in span is subjected to a point load 5kN at 3m from left end A. Analyze the beam by taking 'R_B' and 'M_B' as redundants. Draw SFD and BMD.

Q2) a) Explain 'Unit load Method' to find slope and deflections in structural members. **[5]**

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b) The bent ABC is subjected to lateral load of 10kN as shown in the fig.1 below. Determine the reactions at support C by strain energy method. Draw SFD and BMD **[12]**



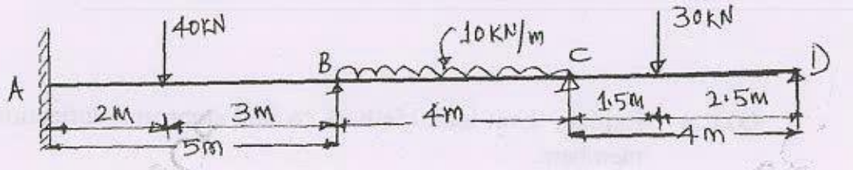
(FIG.1)

)3) A continuous beam ABCD is fixed at A and simply supported at B and C with CD as a overhang wherein AB=4m BC=3m and CD=2m. The span AB is subjected to a udl of 10kN/m throughout, span BC to a point load of 25kN at its midpoint and point D is acted upon by a clockwise couple of 50kNm. During loading support C settles by 5mm. Draw SFD and BMD. Take $EI_{BC} = 2\times10\text{^}4kN/m\text{^}2$. $EI_{AB} = 2EI_{BC}$. **[16]**

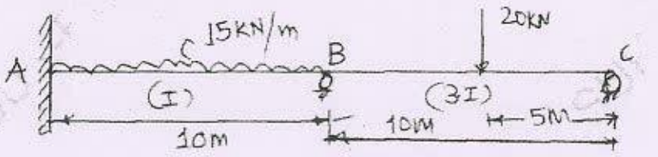
SECTION-II

)4) A two span continuous beam ABC has span AB of 6 m and Span BC of 4 m. End A is fixed while end C of the beam is simply supported. Span AB carries through u.d.l of 20 KN/m and BC carries central point load 40kN.Span AB has its inertia double that of span BC. Analyse the beam using slope deflection method. Draw SFD and BMD. **[17]**

)5) Analysis the continuous beam loaded as shown in fig.by method of moment Distribution method. Sketch the BMD and SFD. **[17]**

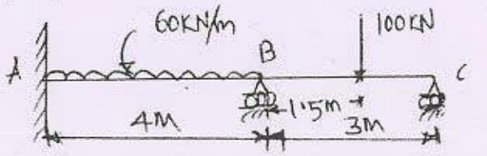


)6) Analysis the two span continuous beam as shown in fig. by stiffness matrix method. Also draw BMD. **[16]**



OR

Analysis the continuous beam as shown in fig.by flexibility matrix method. Take EI constant throughout. **[16]**



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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

GEOTECHNICAL ENGINEERING - I

Sub. Code: 66238

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instruction :

1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make assumptions wherever necessary.**
4) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Answer any three of the following. **[18]**

a) Derive the relation for bulk unit weight of soil in terms of Sp. Gravity, water content, void ratio of soil and unit weight of water.

b) List and explain corrections applied to hydrometer reading in wet mechanical analysis.

c) Explain soil structures according to structural composition of sedimented soil.

d) A soil has a dry density of 1.72 gm/cc in the natural condition. When the 840 gm of the dry soil was poured in a container in a loose state its volume was 602 cc. The same soil when vibrated and compacted was found to have volume of 440 cc. Determine relative density of the soil.

Q2) Answer any two of the following. **[16]**

a) Explain Darcy's law and its validity used for permeability of soil.

b) Explain flow net. Derive Laplace equation in two dimensional flow used for flow net construction.

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c) The results of constant head permeability test on soil are follows:-

Internal diameter of permeameter - 7.5 cm.

Head lost over a soil sample length of 18 cm- 24.7 cm

Quantity of water collected in 60 seconds - 626 cc

Porosity of the soil sample - 44%

Determine the coefficient of permeability of soil and also discharge velocity and seepage velocity during the test.

Q3) Answer any two of the following. **[16]**

a) List laboratory methods for determination of compaction factors. Explain any one.

b) Explain fixed ring type consolidometer test for determination of compressibility characteristics of soil with neat sketch.

c) The following are the results of the standard Proctor compaction test.

Mass of mould and compacted soil (gm)	2925	3095	3150	3125	3070
Water content (%)	10.0	12.0	14.3	16.1	18.2

Volume of mould - 1000 cc, Mass of mould - 1000 gm,

Sp. Gravity of soil solids - 2.70

Plot the compaction curve showing OMC and MDD. Determine the degree of saturation at MDD.

SECTION-II

Q4) Answer any three of the following. **[18]**

a) With a neat sketch explain pressure bulb and its significance.

b) Write a note on Newmark's chart.

c) Prove that maximum vertical stress on a plane at a distance 'r' from concerned load Q acting at ground surface will be at a depth $z = 1.225r$.

d) A water tank is supported by a ring foundation having outer diameter of 8 m and inner diameter of 6m. The uniform load intensity on the foundation is 300kN/m^2. Compute the vertical stress caused by the water tank at a depth of 4 m below the center of the foundation.

Q5) Answer any two of the following. **[16]**

a) Explain unconfined compression test procedure with neat sketches.

b) An unconfined cylindrical specimen of clay fails under an axial stress of 240 kN/m^2. The failure plane was inclined at an angle of 55° to the horizontal. Determine the shear strength parameters of the soil.

c) The results of two drained triaxial tests on a saturated clay follows:-

Specimen I :- σ_3=70 kN/m^2 and σ_d=130 kN/m^2

Specimen II :- σ_3= 160 kN/m^2 and σ_d= 223.5 kN/m^2

Determine the shear strength parameters. Solved by analytical method.

Q6) Answer any two of the following. **[16]**

a) Derive an expression for Rankine's active earth pressure due to submerged cohensionless backfill with neat sketch.

b) A cantilever retaining wall of 7 m high retains sand. The properties of the sand are e = 0.5, ϕ=30°, and G = 2.7. Using Rankine's theory determine the active earth pressure at the base when the backfill is

i) dry

ii) saturated and

iii) submerged.

c) A retaining wall 6 m high retains a clay backfill with c= 20 kN/m^2, ϕ=15° and γ= 18 kN/m^3. Assume that the wall is smooth and the back vertical. It is expected that tension cracks may develop to the full theoretical depth. Calculate the total active earth force a acting on the wall.

SF-20

Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester - V) (Revised) Examination, November - 2017

ENVIRONMENTAL ENGINEERING - I

Sub. Code :66237

Day and Date : Tuesday, 14- 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Assume and mention data if necessary.**

Q1) Answer Any Three of following. **[3 × 6 = 18]**

a) Explain the basis on which the water source is selected for water supply.

b) 'Water should be necessarily treated before municipal supply.' Explain.

c) State details of intake well from its place and importance point of view.

d) Explain design steps for intake well.

e) Write a note on Population Forecasting.

Q2) a) Design a cascade aerator for 10 MLD flow. **[8]**

b) Explain the concept of destabilization of colloidal particles during coagulation. **[4]**

c) Explain the concept of tube & plate settler. **[4]**

Q3) a) What is demineralization? Explain any one process in detail. **[6]**

b) Explain detailed operation of filtration process in rapid sand filter with diagram. **[6]**

OR

b) Explain water softening process. Explain any one in detail. **[6]**

c) Explain forms of chlorination. **[4]**

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SECTION - II

Q4) Answer any three of following. **[3 × 6 = 18]**

a) Explain details of steel pipes with respect to strength, durability, leakage, laying, transportation, availability and advantages.

b) Mention necessity and types of reservoirs in detail.

c) Write a note on

i) Pumping mains

ii) Gravity mains

d) Explain the pressure testing process in detail.

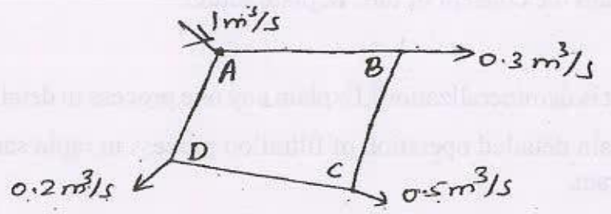
e) Explain factors considered for choice of pipe materials.

Q5) a) What are the various layout patterns of water distribution system? **[5]**

b) A pipe network consist of following pipes- **[8]**

Pipe	Length(m)	Dia(mm)	Friction factor
AB	400	300	0.014
BC	600	300	0.010
AD	500	400	0.012
DC	500	250	0.011

Inflow at A is 1 m3/s, while outflow at B,C and D are 0.3, 0.5 and 0.2 m3/s respectively. Find flow in pipes.



c) "Software plays a vital role in network analysis." Explain. **[3]**

Q6) a) Explain fire hydrants and water meter in detail. **[6]**

b) Explain the maintenance of water distribution system. **[6]**

OR

b) Write a note on green building materials. **[6]**

c) What is water budgeting? **[4]**

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SF - 1008

Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester - V) Examination, November - 2017

DESIGN OF STEEL STRUCTURES (New)

Sub. Code : 66236

Day and Date : Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions Compulsory.**
2) **Use of IS 800:2007, IS 875, Steel table, Non programmable calculator permitted.**
3) **Figure to the right indicate full marks.**
4) **Draw sketches wherever necessary.**
5) **Assume suitable data if required.**

SECTION - I

Q1) a) What is serviceability Limit state? Explain. **[4]**

b) Write note on "High Strength Friction Grip (HSFG) bolts." **[4]**

c) A tension member is subjected to force of 150 KN. The member consists of a plate 75mm × 8mm in size is connected to 10mm thick gusset plate. The grade of steel is Fe 410. Design fillet weld if (a) Weld is provided on two sides of plate in direction of force. (b) Weld is provided on three sides of plate. **[8]**

Q2) a) Explain in brief with sketches the modes of failure of tension members. **[6]**

b) A tension member of a truss consist of two angles 75×50×6 which are provided on either side of a 10mm thick gusset plate. 20mm dia. Bolts are used in one row for connecting the member to the gusset plate. Determine design tensile strength of the member and also the number of bolts required to develop the design tensile strength. **[12]**

OR

b) Design an angle section to carry a factored tensile force of 200 kN. Bolts of 20mm diameter are to be provided for the connection of the member to the gusset plate. Take fy = 250Mpa and fu = 410 Mpa. **[12]**

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P.T.O.

23) a) Explain the terms with reference to compression members, (i) Effective length of struts, (ii) Slenderness ratio. **[4]**

b) Two angles 90×60×8 are used as strut 3m long and connected to 10mm thick gusset plate at each end. Determine the design strength of the strut for the following cases. **[12]**

i) When the longer leg of the angle are connected on either side of gusset plate.

ii) When the longer leg of the angle are connected to same side of gusset plate

SECTION - II

24) a) Why lacing is provided for column? How much load is taken by lacing. **[4]**

b) Design a 8m long built up column to carry a factored axial load of 1250 KN . The column is restrained in position but not direction at each end. The column shall consist of two channels placed toe to toe at a suitable spacing. **[12]**

OR

b) An ISHB400 @759.3 N/m column carries a factored axial load of 2000 KN. Design a slab base for the column. Assume that the bearing surfaces of the column and base plate are machined. The concrete footing is of M20 grade. **[12]**

25) a) What is web buckling and web crippling? How the beam checked against web bucking and crippling? **[6]**

b) A 150mm thick slab is supported on steel beams of effective span 5.25m which are spaced at 3.25m c/c. Allow live load of 3.50 kN/m^2 and a 40mm floor finish at 20 kN/m^3.Design the beam and check it for shear. **[12]**

26) a) Draw neat sketch of (i) crane gantry girder assembly (ii) the typical cross sections for gantry girder. **[4]**

b) The Crane system has the following data. Determine the design forces acting on it. **[12]**

- Crane capacity = 100kN
- Weight of crane girder = 90kN
- Weight of crab,motor,hook = 20kN
- Minimum hook Approach = 1.1 m
- Wheel base = 2.5 m
- Span of gantry girder = 5.5 m
- Weight of gantry girder = 8 kN
- c/c spacing of crane rails = 20 m

The crane is electrically operated.

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Semester-V) (Revised) Examination, November - 2017

WATER RESOURCES ENGINEERING - I

Sub. Code : 66235

Day and Date : Thursday, 09-11-2017 **Total Marks : 100**

Time : 10.0 a.m. to 1.00 p.m.

Instructions :
1) **Que. 1 and 5 are Compulsory. Attempt any two questions from remaining questions from both sections.**
2) **Assume any suitable data if necessary, wherever needed.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) Explain infiltration capacity of the soil with help of a graph. Explain the effects of infiltration. **[6]**

b) Describe the procedure to construct unit hydrograph from storm hydrograph. **[6]**

c) Explain how discharge of the water stream is measured? Explain any one method in detail. **[6]**

Q2) a) Exnlist different methods of assessment of average precipitation. Explain any one method in detail with a neat sketch. **[8]**

b) Define evaporation process. Describe the factors affecting evaporation and also the measures to reduce it. **[8]**

Q3) a) Define unit hydrograph. List the assumptions and limitations involved in unit hydrograph theory. **[8]**

b) Given below are the ordinates of 4 hour unit hydrograph. Derive and plot 16 hour unit hydrograph. Describe the procedure in detail. **[8]**

Time(hours)	0	4	8	12	16	20	24	28	32	36	40
Observed flow(m^3)	0	16	58	89	145	80	55	36	16	8	0

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P.T.O.

Q4) Write detailed notes on: **[16]**

a) Abstract losses from precipitation

b) Factors affecting runoff

c) Site selection criteria for discharge measurement of river.

d) Flood frequency analysis

SECTION-II

Q5) a) Define porosity, specific yield and specific retention and obtain relation between them. **[6]**

b) The base period, intensity of irrigation and duty of water for various crops under a canal system are given below. Determine the reservoir capacity if culturable commanded area is 40000 hectors, canal losses are 20% and reservoir losses are 10%. **[6]**

Crop	Base period (Days)	Duty of water at the field (Hectors/ cumec)	Intensity of irrigation (Percentage)
Cotton	180	1400	10
Sugar cane	360	1700	20
Wheat	120	1800	20
Rice	120	800	15
Vegetables	120	700	15

c) Explain Bandhara irrigation scheme in detail. **[6]**

Q6) a) Derive an expression for discharge from a well in unconfined aquifer the well fully penetrates it. **[8]**

b) Briefly explain role of ground water in water resources development of country. **[8]**

Q7) a) Explain in detail following: **[6]**

i) Intensity of irrigation

ii) Kor watering

iii) Kor depth

iv) Kor period

v) Crop ratio

vi) Overlap allowance

b) Explain estimation of evapo-transpiration by penman method. **[5]**

c) Discuss in brief water logging and land drainage. **[5]**

Q8) a) Explain need and importance of water shed management. **[8]**

b) Explain with neat sketch the layout, main components and working of percolation tanks also explain its advantages and disadvantages. **[8]**

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Total No. of Pages : 3

Seat No.	

T.E. (Civil) (Part - III) (Semester - V) (Revised) Examination, November - 2017

TRANSPORTATION ENGINEERING - I

Sub. Code : 66239

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Explain the classification of roads according to Lucknow Road Plan. **[8]**

b) Explain the factors controlling the highway alignment. **[8]**

OR

b) What do you understand by 'Stopping Sight Distance'? State the factors affecting Stopping Sight Distance. Calculate the SSD on a level road for design speed of 60 kmph for two-way traffic on a single lane road. Assume coefficient of friction 0.36 and reaction time of driver as 2.5 Seconds. **[9]**

Q2) a) What is the significance of 'Penetration Test on Bitumen'? Explain the procedure in detail. **[8]**

b) Explain functions of the components of a flexible pavement with sketch. **[8]**

OR

b) Explain 'CBR Test'. How the pavement thickness is determined by CBR method? **[9]**

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P.T.O.

Q3) a) What are the objects of conducting 'Traffic Volume Study'? Explain the methods of Traffic Volume Study. [8]

b) Explain the steps of construction of Cement Concrete Pavements. [8]

OR

b) State the necessity and methods of Highway Drainage. [8]

SECTION - II

Q4) a) Explain movement of aeroplane about three axes with a neat sketch. [8]

b) Explain with sketches, [8]

i) Fillets,

ii) Holding Apron

OR

b) Determine the length of runway required for following data, [9]

Basic runway length under standard conditions = 1200m

Site elevation above M.S.L. = 900 m

Aerodrome reference temperature = 16°C

Effective gradient = 0.5%

Q5) a) Explain with sketches, [8]

i) Wave action on a sea wall

ii) Littoral Drift

b) Explain Dry Docks and Wet Docks. [8]

OR

b) Explain the requirements of a harbour. State the factors to be considered while selecting a harbour. [8]

Q6) a) Explain: [8]

i) Lighting in tunnels;

ii) Ventilation in tunnels

b) Explain 'Shield Method' of tunneling in soft ground with sketch. [8]

OR

b) Explain the operations in sequence in one cycle of tunneling in hard rock. [9]

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Total No. of Pages : 3

Seat No.	

T.E. (Civil Engg.) (Part - II) (Semester - VI) (Revised) Examination, November - 2017
ENGINEERING MANAGEMENT
Sub. Code: 66875

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to right indicates full marks.**
3) **Assume suitable data if necessary.**

SECTION - I

Q1) a) Enumerate principles of management given by Henry fayol and explain any three of them? **[8]**

OR

a) With suitable example explain decision tree? **[8]**

b) Four salesman are to be assigned to four district Estimates of sales revenue in thousands of rupees for each salesman is given below.

Assign salesman to the district. **[10]**

Salesman	District			
	A	B	C	D
01	32	35	40	28
02	40	25	30	22
03	42	27	34	30
04	25	39	41	35

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P.T.O.

Q2) a) Enumerate types of organization? With neat organization structure diagram explain any one along with its advantages and disadvantages? **[8]**

OR

a) Define planning? Explain process and characteristic of planning? **[8]**

b) Calculate total cost of inventory & EOQ from following annual consumption of 36000 units, inventory carrying cost is 20%per annum with ordering cost 25 RS associated with one order & cost per item is 1 Rs? **[8]**

Q3) Write any two **[16]**

a) Derive derivation for EOQ formula.

b) State and describe importance of management in construction industry.

c) Explain ABC analysis concept with neat graph?

SECTION - II

Q4) a) Suggest which equipment should be purchased if rate of interest is 12% per year by using present worth method.

	Equipment A	Equipment B
Initial Cost (Rs)	Rs 25000/-	Rs 35000/-
Annual O & M cost (Rs)	Rs 9000/-	Rs 7000/-
Salvage value (Rs)	Rs 2000/-	Rs 3500/-
Life (in Years)	5	5

[12]

b) With suitable example explain the term equivalence. **[6]**

OR

b) With suitable example explain the term time value of money. **[6]**

Q5) a) Draw a typical layout for site of construction of multistoried building. **[5]**

OR

a) What do you know about child labour act? **[5]**

b) What are the factors considered for site layout? **[5]**

c) Write a detailed note on building and other construction workers act. **[6]**

Q6) Write Any 2 **[16]**

a) Write down procedure for value analysis?

b) Draw quality circle organization structure and explain benefits of quality circle?

c) With neat flow chart describe the procedure of work study?

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Total No. of Pages :3

Seat No.	

T.E. (Civil) (Semester - VI) (New) Examination, November - 2017

ENGINEERING GEOLOGY

Sub. Code: 66876

Day and Date :Monday, 06 - 11- 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Answer to the two sections must be written in one and same answer book.**
3) **Figures to the right indicate full marks.**

SECTION-I

Q1) Attempt any two of the following:

a) Describe with neat sketches depositional features formed by river. **[9]**

b) What is meant by Igneous Rock? Give the classification of Igneous Rocks on the basis of mode of occurrence. Mention one rock from each group. **[9]**

c) What are the parameters of fault? Explain the causes of faulting. **[9]**

Q2) Attempt any two of the following:

a) Explain in brief various process of weathering. **[8]**

b) What is metamorphism? Describe in detial the agents of metamorphism. **[8]**

c) Describe with the help of neat sketches the part of folds. Give in brief the Civil Engineering significance of fold. **[8]**

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Q3) Write short notes on: [16]

a) Interior of the Earth.

b) Grain size classification of Sedimentary Rocks.

c) Types of unconformity.

d) Scope of Engineering Geology.

SECTION-II

Q4) Attempt any two of the following:

a) Explain the various causes of earthquake. Write a brief note on RIS. [9]

b) Describe the internal causes of landslides. [9]

c) With a suitable sketch explain the zones of groundwater. [9]

Q5) Attempt any two of the following:

a) Explain the various steps in the preliminary geological investigation at a civil engineering site. [8]

b) Data obtained from a drill hole at foundation site is as follows. [8]

i) Top of borehole- R.L.410 m.

ii) Bottom of borehole- R.L. 380 m.

iii) Length of each piece of core obtained between 400m and 397m is, 16, 11, 13, 09, 08, 21, 23, 06, 05, 09, 08, 14, 19, 23, 21, 16, 18, 07, 06, 07, 10

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Find,

1) Total length of core recovered

2) Core Recovery

3) Core loss

4) RQD

c) Explain the suitable and unsuitable conditions for excavating a tunnel. **[8]**

Q6) Write short notes on the following: **[16]**

a) Dams on Deccan Trap.

b) Overbreak.

c) Observations during drilling.

d) Confined aquifer.

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Seat No.	

Total No. of Pages : 2

B.E. (F.E.) (All Branchs) (Semester - I & II) Examination, November - 2017

BASIC MECHANICAL ENGINEERING

Sub. Code : 59186

Day and Date :Friday, 24 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions:
1) **Attempt any three questions from each section.**
2) **Figures to right indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

SECTION - I

Q1) a) Define thermodynamic state, thermodynamic process and thermodynamic cycle. **[6]**

b) Explain Kelvin Planck Statement and Clausius statement of second law of thermodynamics. **[4]**

c) In centrifugal compressor the suction and delivery pressure are 100 Kpa and 550 Kpa respectively. The compressor draws 15 m^3/min of air which has specific volume of 0.77 m^3/Kg. At delivery point the specific volume is 0.20 m^3/Kg. The compressor is driven by a 40 Kw motor and during passage of air through the compressor the heat loss to the surroundings is 30 KJ/Kg of air. Neglecting changes in potential energy and kinetic energy calculate increase in internal energy per kg of air. **[6]**

Q2) a) What are similarities and dissimilarities between heat and work? **[6]**

b) What is statement of first law of thermodynamics and state its limitations. **[6]**

c) Steady flow process is applied to nozzle. Steam enters horizontally at a pressure of 10 bar. The pressure of steam at the exit of the nozzle is 1 bar. The internal energy of the steam decreases by 250 KJ/Kg and specific volume increase from 0.2 m^3/Kg to 1.7 m^3/Kg as the steam flows through the nozzle. Find the exit velocity of steam if its inlet velocity is 900 m/min. Heat transferred from nozzle is negligible. **[6]**

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P.T.O.

Q3) a) Compare two stroke and four stroke I.C. Engine. [8]

b) Derive an expression for air standard efficiency for Otto cycle. Explain that the efficiency of an air standard Otto cycle is a function of compression ratio only. [8]

Q4) a) Differentiate between Vapour compression refrigeration and Vapour absorption refrigeration. [4]

b) Define following terms : [4]

i) Dew point temperature

ii) Relative humidity

iii) Wet bulb temperature

iv) Dry bulb temperature

c) Explain with neat sketch Vapour absorption refrigeration system. [8]

SECTION - II

Q5) a) Explain with neat sketch construction and working of Geothermal power plant. [8]

b) Explain axial flow compressor with neat sketch. [8]

Q6) a) Two pulleys having diameter 2 m and 1.5 m are separated by a distance of 5 m. The initial tension in the belt is 3 KN. The coefficient of friction between the belt and pulley is 0.3. Calculate the power transmitted by open belt when a smaller pulley rotates at 200 r.p.m. Neglect centrifugal tension. [8]

b) Explain with neat sketch working of Photovoltaic cell. [8]

Q7) a) Explain manufacturing process. Define metal removing process. Explain any one. [8]

b) Enlist different metal joining processes. Explain brazing process. [8]

Q8) Write short note on : [18]

a) Solar collector

b) Centrifugal pump

c) Sand casting process

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SF - 5

Total No. of Pages :2

Seat No.	

F.E. (All Branches) (Part - I) (Semester - I & II) (Revised) Examination, November - 2017

FUNDAMENTALS OF ELECTRONICS AND COMPUTERS

Sub. Code: 59184

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**

2) **Figures to right indicate full marks.**

3) **Assume suitable data if necessary.**

SECTION - I

Q1) Solve any two : **[18]**

a) Explain HW rectifier with necessary waveforms.

b) What is flip-flop? Explain J-K flip-flop.

c) Write a short note on mobile handset with block diagram.

Q2) Solve any two : **[16]**

a) Explain how transistor operates in CB configuration? Explain with I/P and O/P characteristics.

b) What is De-multiplexer? Explain 1 :4De-mux with truth table

c) Explain washing machine with block diagram.

Q3) Solve any two : **[16]**

a) Explain fixed bias circuit for biasing of transistor. Derive expression for stability factor.

b) Mention names of logic families and explain any one in detail.

c) Explain in details thermistor transducer with an application.

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P.T.O.

SECTION - II

Q4) Solve any two : **[18]**

a) What are different hardware component of a computer system. Explain any four of them.

b) What is operating system? Explain different types of OS.

c) Write short note on computer network.

Q5) Solve any two : **[16]**

a) List and explain different topologies of computer network.

b) Explain output devices of computer system.

c) Explain following UNIX/LINUX command with an example.

i) LS.

ii) CD.

iii) CAT.

iv) MKDIR.

v) PWD.

vi) CP.

Q6) Solve any two : **[16]**

a) Explain OSI model.

b) Explain in brief Assembler, interpreter and compiler.

c) Explain low level language and high level language in details.

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SF-1

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Part - II) (Semester - I & II) (New) Examination, November - 2017

ENGINEERING MATHEMATICS-II

Sub. Code : 59933

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) Solve any THREE from the following: (5 marks each). **[15]**

a) $(1+x^2)\frac{dy}{dx}+2xy-4x^2=0$

b) $\left[y\left(1+\frac{1}{x}\right)+\cos y\right]dx+[x+\log x-x\sin y]\,dy=0$

c) $(x^3y^2+xy)\,dx=dy$

d) $(x^2y-2xy^2)dx-(x^3-3x^2y)dy=0$

Q2) Attempt any THREE from the following: (5 marks each). **[15]**

a) Find orthogonal trajectories of the family of curves $x^2+y^2=2ax$, where a is parameter.

b) A 12 V battery is connected to a simple series circuit in which the inductance is $\frac{1}{2}$H and resistance is 10 Ω determine the current i if $i(0)=0$.

c) A body originally at 85° C cools to 65° C in 25 minutes the temperature of air being 40° C, what will be the temperature of the body after 40 minutes.

d) If the population of a country is doubles in 50 years, in how many years will it three times under the assumption that the rate of increase is proportional to the number of inhabitants?

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P.T.O.

Q3) Attempt any FOUR from the following: (5 marks each). **[20]**

a) Using Euler's method find the approximate value of y when $x = 1.5$ given $\frac{dy}{dx} = \frac{y-x}{\sqrt{xy}}$ and $y(1) = 2$. Take $h = 0.1$

b) Use Euler's modified method to find the value of y satisfying the equation $\frac{dy}{dx} = -xy^2$ with $y(0) = 2$ for $x = 0.2$

c) Use Taylor's series to solve numerically $\frac{dy}{dx} = 3x + y^2$. Given that $y(0) = 1$ at $x = 0.1$.

d) Apply Runge-Kutta fourth order formula to solve the differential equation $\frac{dy}{dx} = \sqrt{\sin x + \cos y}$, $y(0) = 1$ at $x = 1.5$

e) Solve the following simultaneous differential equations by Runge-Kutta method fourth order $\frac{dy}{dx} = xz + 1, \frac{dz}{dx} = -xy$ for $x = 0.3$ given that $y = 0$, $z = 1$, when $x = 0$.

SECTION - II

Q4) Attempt any THREE from the following: (5 marks each). **[15]**

a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$.

b) Evaluate $\int_0^\infty \frac{x^4(1+x^5)}{(1+x)^{15}} dx$.

c) Prove that $\int_0^\infty \frac{e^{-\alpha x} \sin x}{x} dx = \cot^{-1}\alpha$ and hence deduce that $\int_0^\infty \frac{\sin x}{x} dx = \frac{\pi}{2}$.

d) Define Error function and hence prove that $erf(\infty) = 1$.

Q5) Attempt any THREE from the following: (5 marks each). **[15]**

a) Trace the Strophoid curve $y^2(a+x) = x^2(a-x)$ where $a > 0$.

b) Trace the Leminiscate curve $r^2 = a^2 \cos 2\theta$.

c) Find the length of the arc of $y^2 = 4x$ cut off by the line $3y = 8x$.

d) Show that the length of arc of that part of cardioide $r = a(1+\cos\theta)$ which lies on the side of the line $4r = 3a \sec\theta$ away from the pole is $4a$.

Q6) Attempt any FOUR from the following: (5 marks each). **[20]**

a) Evaluate $\int_1^2 dx \int_1^3 xy^2 dy$

b) Evaluate $\int_0^{\pi/2} \int_0^y \cos 2y \sqrt{1 - a^2 \sin^2 x}\, dx\, dy$

c) Change into polar co-ordinates and hence evaluate $\int_0^a \int_y^a \frac{x^2}{(x^2+y^2)^{3/2}} dx\, dy$.

d) Find by double integration the area lying between the cardioide $r = a(1+\cos\theta)$ and outside the circle $r = a$.

e) ABCD is a square plate of side a and o is the midpoint of AB. If the surface density is proportional to the square of the distance from o, show that the center of gravity of the plate is at a distance $\frac{7}{10}a$ from AB.

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b) A 2000N block is in contact with level plane; coefficient of friction is 0.30, if the block is acted upon horizontal force 650 N. What time elapse before the block reaches a velocity of 10 m/s starting from rest? If 650 N force is then removed how much longer will the block continue to move solve by using impulse-momentum principle. **[12]**

Q6) a) Explain motion under gravity. **[3]**

b) Explain coefficient of restitution. **[3]**

c) A ball dropped from height of 2 m on a smooth floor. The height of the first bounce is 1.62m. Determine

i) coefficient of restitution and

ii) expected height of next bounce. **[10]**

Seat No. [ ]

F.E. (All Branches) (Semester - I & II) (New) Examination, November - 2017

APPLIED MECHANICS

Sub. Code: 59185

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All the questions are compulsory.**
2) **Figures to the right indicate maximum marks for the question.**
3) **Neat sketches should be drawn whenever necessary.**
4) **Use of Non-Programmable calculator is allowed.**
5) **Any missing data may be assumed suitably and clearly highlighted in the anwser sheet.**

SECTION-I

Q1) a) Explain:-

i) Resolution of forces

ii) Couple **[4]**

b) Find resultant for the force system shown in figure and locate it with respect to 'A' **[12]**

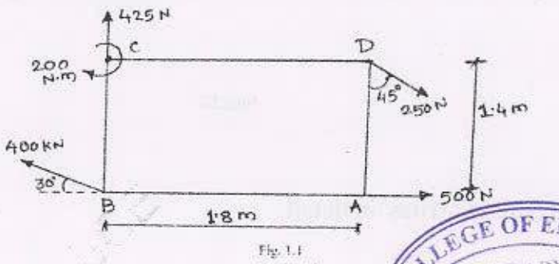


Fig. 1.1

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P.T.O.

Q2) a) State and explain virtual work principle. [5]

b) The cylindrical rollers of weight 50 N each are placed inside a cup. Find the reactions at the point of contact. Refer fig. 2.1 [13]

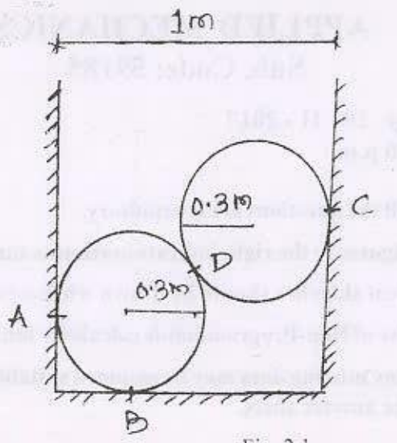


Fig. 2.1

OR

b) Determine the support reaction for the beam shown in fig. 2.2 by using Virtual work principle. [13]

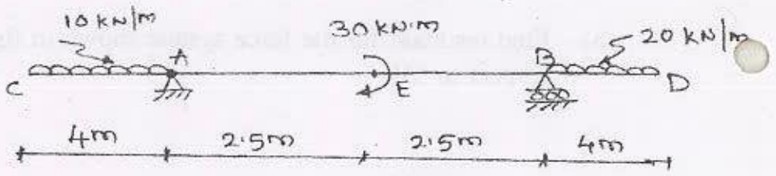


Fig. 2.2

Q3) a) Explain 'Truss' in detail. [4]

b) Determine the forces in all the members of a truss shown in fig. 3.1. [12]

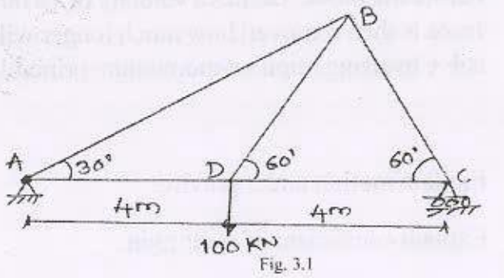


Fig. 3.1

SECTION-II

Q4) a) State and prove parallel axis theorem. [4]

b) Find the moment of inertia for the shaded area about centroidal both mutually perpendicular axes. Refer fig 4.1. [12]

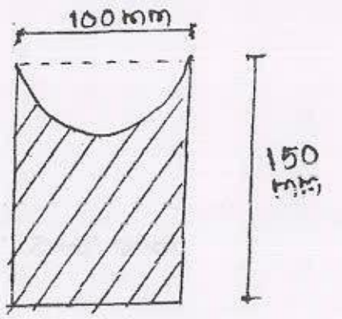


Fig. 4.1

Q5) a) Explain S-t, V-t and a-t curves. [6]

b) An elevator cage of mine shaft weighing 15 KN when empty is lifted or lowered by means of wire rope. Once man weighing 900 N entered in it and moving down with uniform acceleration such that when distance of 250 m was covered. The velocity of the cage 30 m/s. Determine the tension in the rope and force exerted by the man on the floor of the cage. [12]

OR

)6) Attempt any three of the following. [15]

a) Solve the following equations by Gauss-Jordan method
$x+y+z=5; 2x+3y+z=10; 3x-2y+2z=3$.

b) Use Jacobi's iteration method (Three iterations only) to solve
$5x+2y+z=12; x+4y+2z=15; x+2y+5z=20$.

c) Use Gauss-Seidal method (03 iterations) to solve the equations
$x+7y-3z=(-22); 5x-2y+3z=18; 2x-y+6z=22$.

d) Find the largest eigen value of matrix $A=\begin{bmatrix}1 & 6 & 1\\ 1 & 2 & 0\\ 0 & 0 & 3\end{bmatrix}$ by Rayleigh's power method with $x=\begin{bmatrix}1\\0\\0\end{bmatrix}$ as a base vector.

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Total No. of Pages : 4

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F.E. (All Branches) (Part-I) (Semester-I & II) (Revised) Examination, November - 2017
ENGINEERING MATHEMATICS-I
Sub. Code : 59177

Total Marks : 100

y and Date : Monday, 27-11-2017
me : 2.30 p.m. to 5.30 p.m.

structions : 1) All the questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

SECTION-I

)1) Attempt any three of the following. [15]

a) Find non-singular matrices P and Q such that PAQ is in the normal form and hence find rank of A where $A=\begin{bmatrix}1 & 2 & 3 & 4\\ 2 & 1 & 4 & 3\\ 3 & 0 & 5 & -10\end{bmatrix}$.

b) Discuss the consistency of the following system of equations and if possible solve them $2x-y-z=2, x+2y+z=2, 4x-7y-5z=2$.

c) Use matrix method to determine the value of λ for which the equations $x+2y+z=3, x+y+z=\lambda, 3x+y+3z=\lambda^2$ are consistent and solve them for any one value of λ.

d) Solve $2x-y+3z=0, 3x+2y+z=0, x-4y+5z=0$, by matrix method.

Q2) Attempt any three of the following. **[15]**

a) Examine for linear dependence of vectors (1,2,–1,0), (1,3,1,2), (4,2,1,0), (6,1,0,1) and find a relation between them if dependent.

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P.T.O.

b) Determine the Eigen values and Eigen vector corresponding to greatest Eigen value only, for $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$.

c) Find the Eigen values of matrix $A=\begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$. Hence find Eigen values for A^4, A^{-1}, $5A$ by using properties of eigen values.

d) Verify Cayley Hamilton theorem for $A=\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$.

Q3) Attempt any four of the following. **[20]**

a) Simplify $\dfrac{(\cos 5\theta - i\sin 5\theta)^2(\cos 7\theta + i\sin 7\theta)^{-3}}{(\cos 4\theta - i\sin 4\theta)^9(\cos\theta + i\sin\theta)^5}$.

b) Find all the values of $\left(\dfrac{1}{2}+i\dfrac{\sqrt{3}}{2}\right)^{\frac{1}{4}}$.

c) Prove that $\tanh^{-1}x=\dfrac{1}{2}\log\left(\dfrac{1+x}{1-x}\right)$.

d) Express $\dfrac{\sin 7\theta}{\sin\theta}$ in powers of $\sin\theta$ only.

e) Prove that $\left(\dfrac{\cosh x+\sinh x}{\cosh x-\sinh x}\right)^n=\cosh 2nx+\sinh 2nx$.

f) Express $\cos^{-1}\left(\dfrac{3i}{4}\right)$ in the form (a + ib).

SECTION-II

Q4) Attempt any three of the following. **[15]**

a) Expand $e^{x\cos x}$ in powers of x upto x^4 term.

b) Use Maelaurin's series to expand function $\tan\left(\dfrac{\pi}{4}+x\right)$ in a ascending power of x.

c) Use Taylor's series to find $\left(\sqrt{25.15}\right)$ correct upto four decimal places.

d) Evaluate $\lim\limits_{x\to 1}\left[\dfrac{x-x^x}{1+\log x-x}\right]$.

Q5) Attempt any four of the following. **[20]**

a) If $u=\log(x^3+y^3-x^2y-xy^2)$ then prove that $\left(\dfrac{\partial}{\partial x}+\dfrac{\partial}{\partial y}\right)^2 u=\dfrac{-4}{(x+y)^2}$.

b) If $u=\dfrac{1}{2}\log(y^2-x^2)$ then find the value of $\left(x\dfrac{\partial u}{\partial x}+y\dfrac{\partial u}{\partial y}\right)$.

c) If $u=xyz$; $v=x^2+y^2+z^2$; $w=(x+y+z)$ then find $J\left(\dfrac{u,v,w}{x,y,z}\right)$.

d) Find the minimum and maximum values of $(x^3+3xy^2-3x^2-3y^2+4)$.

e) If power P is given by $P=\left(\dfrac{E^2}{R}\right)$. Find the approximate percentage error in power P if E is increased by 3% and R is decreased by2%.

SF - 2

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester - I & II) (New)

Examination, November - 2017

ENGINEERING PHYSICS

Sub. Code: 59176

Day and Date : Friday, 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Given:- Avogadro's number = 6.02×10^{26}/kg.atom
Planck's constant h = 6.63×10^{-34} J.s
Electronic charge e = 1.6×10^{-19} C
Electron mass m=9.1×10^{-31} kg

SECTION - I

Q1) Attempt Any Three from the following questions.

a) What is grating? Give theory of plane transmission grating for normal incidence. **[6]**

b) Explain construction and working of Laurent's half shade polarimeter. **[6]**

c) i) What is double refraction? **[3]**

ii) A tube of sugar solution 20 cm long is placed between crossed Nicols and illuminated with a monochromatic light. If the optical rotation produced is 13° and specific rotation is 65°dm/g/cm^3, determine the concentration of the solution. **[2]**

d) A grating has 6000 lines per cm on it. Its width is 10cm, calculate

i) the resolving power in the second order and

ii) the smallest wavelength that can be resolved in the third order in 6000 Å wavelength. **[5]**

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Q2) Attempt Any Three from the following questions.

a) With neat diagram explain construction and working of ruby laser. [6]

b) Discuss industrial and medical applications of laser. [6]

c) Explain the advantages of optical fiber. [5]

d) With suitable diagram explain the terms : acceptance angle, acceptance cone and Numerical aperture of an optical fiber. [5]

Q3) Attempt Any Three of the following questions.

a) What is nuclear reactor? Explain various features used in the classification of a Nuclear reactor. [6]

b) Calculate the power output of a nuclear reactor which consumes 50gm of U^{235} Per day. Assume 5% reactor efficiency. Given: Energy released per fission of U^{235} Is 200MeV. [5]

c) What do you mean by thermonuclear reactions? Give proton-proton chain reaction. [5]

d) Write note on fusion power reactor. [5]

SECTION - II

Q4) Attempt Any Three from the following questions.

a) Find the number of atoms per unit cell, the coordination number and the atomic radius of BCC lattice. [6]

b) What are Miller Indices? How are they determined?
Draw the planes in cube (111) and (110) [6]

c) Explain the terms unit cell and their types. [5]

d) i) Explain the centre of symmetry. [2]

ii) A beam of X-rays of wavelength 0.71 Å is diffracted by (110) plane of rock salt with lattice constant of 2.8 Å. Find the glancing angle for the second order diffraction. [3]

Q5) Attempt Any Three from the following questions.

a) Discuss de-Broglie's concept of matter waves. Find an expression for the de-Brogile wavelength associated with a particle accelerated through a potential difference 'V' volts. [6]

b) What is Compton Effect? Explain experimental arrangement used to study Compton Effect. Write the formula for Compton Shift. [6]

c) State and explain Heisenberg's uncertainity principle. [5]

d) i) State properties of matter wave. [2]

ii) Determine the velocity and kinetic energy of a neutron having de-Broglie wavelength 1.0 Å. Mass of neutron is 1.67×10^{-27} kg. [3]

Q6) Attempt Any Three from the following questions.

a) With neat diagram explain construction and working of Atomic Force Microscope. [6]

b) Explain the electrical, magnetic and mechanical properties of nanomaterials. [5]

c) What are different types of the CNT? Explain any two properties of CNT in detail. [5]

d) Explain the ball milling method for getting nano particles. [5]

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SF-4

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester - I & II) (Revised) Examination, November - 2017

BASIC ELECTRICAL ENGINEERING

Sub. Code : 59178

Day and Date : Thursday, 09-11-2017 **Total Marks : 100**

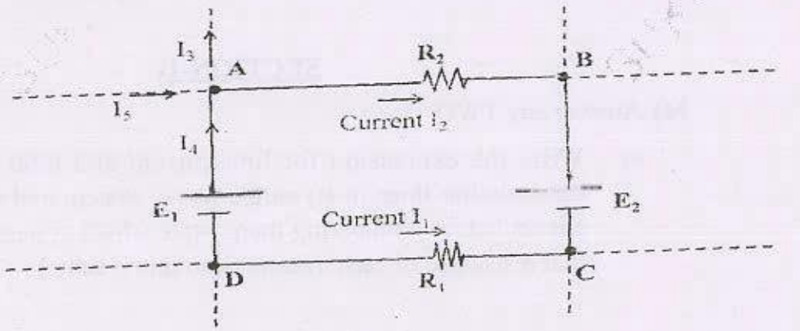
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled diagrams as a part of explanation.**
4) **In case of any missing data, assume suitable value. State it clearly.**

SECTION-I

Q1) Answer any TWO: **[2×9=18]**

a) State Kirchhoff's laws. Write KCL and KVL equations for node A and loop ABCDA in following circuit. Explain the sign rules used while writing your equations.



b) Derive an expression for Magneto motive force of a series magnetic circuit having three different magnetic materials. Draw equivalent electrical circuit and equivalent expression for the same.

c) An electric toaster has rating 1000 W, 240V. Find its resistance. The toaster is connected to 220V supply instead of the rated voltage. Now calculate current & power taken at 220V. If toaster works for 5 minutes, Calculate the cost of energy at Rs. 4/KWh.

P.T.O.

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Q2) Answer any TWO: **[2×9=18]**

a) Derive the mathematical expression for average value of sinusoidal AC by analytical method. Mention one application where average value of AC is important.

b) Define power factor in AC system. State causes and drawbacks of low power factor.

c) If a single phase series A.C. circuit has applied voltage $v = 100 \sin(wt + 20°)$ volt and current $i = 15 \sin(wt + 60°)$ ampere

Determine - Impedance, phase difference, power factor, Resistance, Reactance, Power.

Q3) Answer any TWO: **[2×7=14]**

a) Draw and explain working of single phase induction type energy meter.

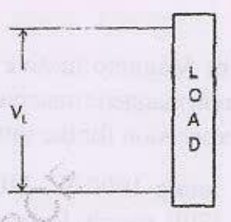
b) State the importance of earthing in electrical installation. Explain with neat sketch any one earthing method.

c) Draw circuit diagram and explain the operation of fluorescent tube working on sinusoidal AC voltage. State its advantages as compared to incandescent bulb.

SECTION-II

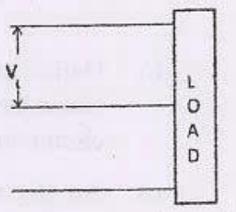
Q4) Answer any TWO: **[2×7=14]**

a) Write the expression for line current and total I^2R power loss in transmission lines in (i) single phase system and (ii) 3 phase system shown below. Comparing them, state which system is better. (Assume that resistance of each transmission line is same)



Load takes power P

Pf of load = cos Φ



Load takes power P

Pf of load = cos Φ

b) Draw circuit diagram for (i) star connected circuit (ii) delta connected circuit. Show line voltage, phase voltage, line current, phase current on each diagram. For each circuit, write the relation between (1) line voltage and phase voltage (2) line current and phase current.

c) Define and explain

i) balanced 3 phase supply

ii) phase sequence

iii) balanced 3 phase load

Q5) Answer any TWO: **[2×9=18]**

a) List the advantages of rotating field alternator as compared to rotating armature alternator. Why slip rings-brushes are required in an alternator?

b) Explain the working of transformer with load. Draw suitable diagrams.

c) Two windings of a transformer have 1000 turns and 500 turns. It is used as a step up transformer with 200 V ac supply and 0.8 pf load. The load current is 5A. Find (i) secondary voltage (ii) primary current (iii) the copper loss at this load, (iv) efficiency of transformer at this load,. Given: Iron loss of the transformer = 30W, Copper loss of the transformer at 1A load current is 3W.

Q6) Answer any TWO: **[2×9=18]**

a) State important features of universal motor. What are the disadvantages due to commutator?

b) List the differences between split phase induction motor and shaded pole induction motor? With reasons state which of the above motors is preferred for (i) compressor (ii) sound recording instrument.

c) Explain the working of split phase induction motor. Draw suitable diagrams.

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SF-6

Total No. of Pages : 3

Seat No.	

First Year Engineering (All Branches) (Semester - II) (New)

Examination, November - 2017

BASIC CIVIL ENGINEERING

Sub. Code :59179

Day and Date : Tuesday, 14- 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumptions wherever necessary and mention it clearly.**
4) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) a) Explain significance of branches of Civil Engineering. **[8]**

OR

a) Enlist various principles of building planning. Explain Privacy, Sanitation in detail. **[8]**

b) Write short note on orientation of building. **[4]**

c) Write down the specific Bye Laws for, **[4]**

i) Open space requirement

ii) FSI

Q2) Answer the following. **[18]**

a) Differentiate between:

i) Uniform and differential settlement

ii) Shallow and Deep foundation

b) Explain with neat sketch functions of different elements of substructure and superstructure.

c) What is deep foundation? Explain pile foundation with neat sketch.

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3) a) Write short note on [8]

i) Different roofing materials.

ii) Types of cement with their properties.

OR

a) Differentiate between [8]

i) load bearing and framed structures.

ii) RCC steel and structural steel

b) What are the characteristics of good brick? [4]

c) Write uses of plastic as a Building material. [4]

SECTION - II

4) a) Classify surveying on the basis of instruments used? Explain the principles on which surveying works. [4]

b) State & Explain in detail Principle of Optical Square. [4]

c) The distance between two villages was measured with a 20 m chain and was found to be 2719 m. The same distance was measured with 30 m chain and was found to be 13,600 links. The test shows that both chains were incorrect. What correction is required in the 20 m chain, if the 30 m chain is 0.5 links too long? [8]

OR

Observed bearings for a closed compass traverse are given below. Find the local attraction at each end of the affected station and correct all bearings. Tabulate the data and results. Find also included angles. Show all calculations. [8]

Line	PQ	QR	RS	ST	TP
F.B	N 48° W	N 9° E	S 83° E	S 15° E	S 64° W
B.B	S 50° E	S 7° W	N 80° W	N 15° W	N 65° E

5) a) Attempt any Two questions from following

i) How planimeter is used for measuring areas of irregular figures? [4]

ii) Differentiate between Rise & fall method and collimation plane method. [4]

iii) Explain characteristics of contours with neat sketch. [4]

b) The following staff readings were observed on a continuously sloping ground with the help of a dumpy level and 4m staff at 30 m interval. The last reading was taken on B.M. of RL 240.120 m.

0.420, 1.660, 2.880, 0.580, 1.385, 2.270, 2.995, 3.800, 0.625, 2.365, 3.225, 3.630.

Enter the readings in a page of level book. Find R.L.s by Rise and Fall method. Apply usual checks. Determine longitudinal gradient. [10]

6) a) Differentiate between rigid and flexible pavement. [4]

b) Explain the components of railway track (Broad gauge). [4]

c) State the types of dams. Explain gravity dam with neat sketch. [4]

d) Explain with neat diagram functions of units in water treatment plant. [4]

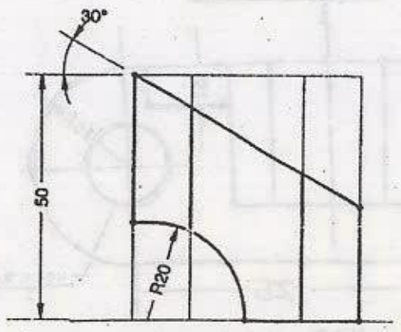
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Q6) Solve any one.

a) Solve.

i) A right circular cone of base dia. 50mm & axis 70mm stands on HP. It is cut by AVP which makes an angle 60° to VP & 8mm away from axis. Draw SFV, TV & true shape of section. [7]

ii) Figure shows FV of hexagonal prism with two cutting planes. Complete the development of lateral surfaces of prism. [6]



OR

b) Solve

A pentagonal base pyramid with base side 25mm & height 50mm is resting on HP. With one of its base edge perpendicular to VP. It is cut by section plane 45° to HP & passing through its RHS corner. Draw FV, sectional TV, and true shape of section also development of remaining part of pyramid. [13]

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Total No. of Pages : 4

Seat No.	

F. E. (All Branches) (Part - I) (Semester - I & II) (Revised)

Examination, November - 2017

ENGINEERING GRAPHICS

Sub. Code : 59180

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 100**

Time : 02.30 p.m. to 06.30 p.m.

Instructions :
1) **Assume suitable data if necessary.**
2) **Use both sides of drawing paper.**
3) **All dimensions are in mm.**
4) **All questions are compulsory.**

SECTION - I

Q1) Solve any two : [12]

a) Construct hyperbola having focus 70 mm away from directrix and eccentricity 4/3. Also draw a tangent & normal at any point P on curve.

b) To construct an Archimedean spiral of two revolutions, given the greatest & shortest radius is 100mm & 10mm resp.

c) A circle of 50mm diameter rolls on horizontal line for half revolution clockwise and then on a vertical line for another half revolution. Draw the curve traced out by a point 'P' on base of circumference of circle.

Q2) a) Solve any three. [12]

i) Complete the projections of line AB having its TL is 60mm, bearing of S60E & FV makes an angle 30° to HP. (Ref. Fig. 1 (i))

ii) Find angle between line AB & CD. (Ref. Fig. 1 (ii))

iii) Line AB is parallel to line CD having true length 50 mm. Complete the projections of line CD. (Ref. Fig. 1 (iii))

iv) Find angle made by plane PQR with HP and VP. (Ref. Fig. 1 (iv))

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b) Solve. [13]

A triangular Plate ABC, AB = 60 mm, BC=45 mm and AC=30mm has its longest side in VP and inclined at 30° to HP. Draw its projections if its surface is inclined at 45° to the VP.

Q3) Solve. [13]

A right circular cylinder with 50mm dia. & height 70mm rest on Hp. Such that the base is inclined at 60° to HP & its axis is inclined 45° to VP. Complete projections of cylinder.

SECTION -II

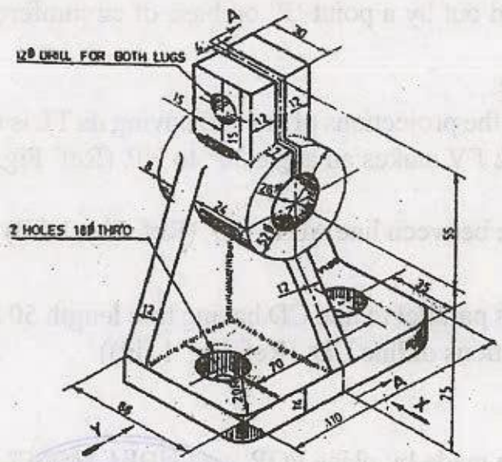
Q4) Solve. [24]

The following figure shows a bracket. Draw the following views:

a) FV from X direction

b) TV&

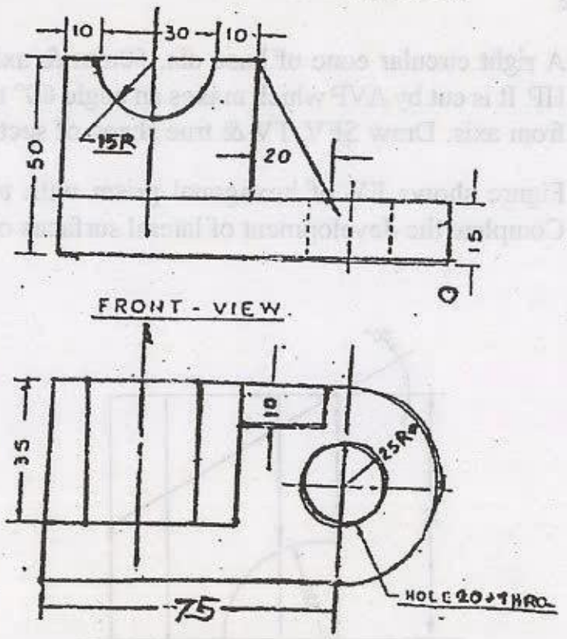
c) Sectional LHSV along section AA.



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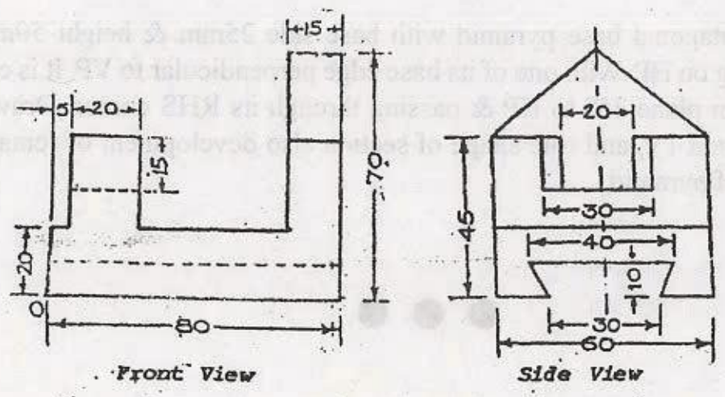
Q5) Solve any one. [13]

a) Figure shows the views. Draw its isometric view.



OR

b) Figure shows the views. Draw its isometric view. [13]



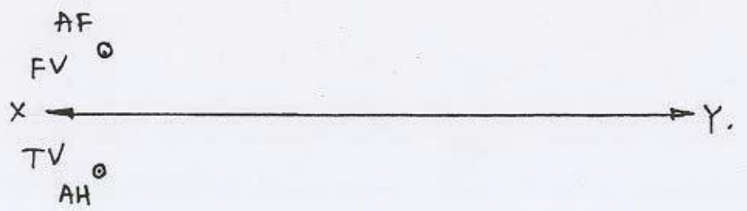


Fig 1 · (i)

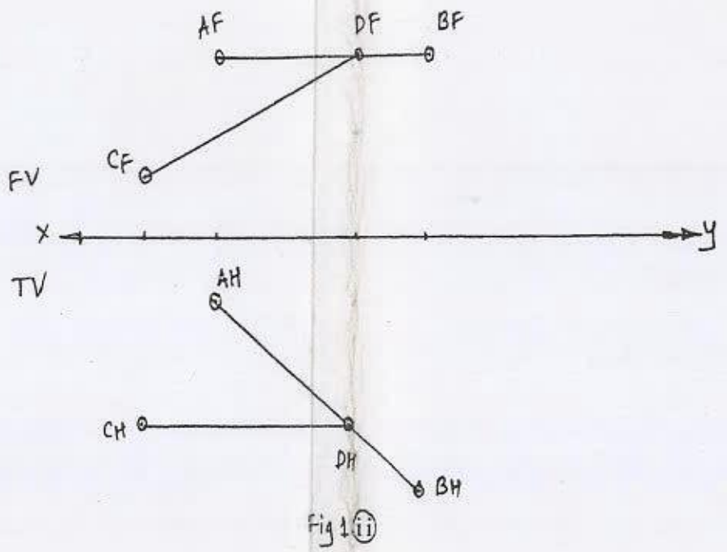


Fig 1 (ii)

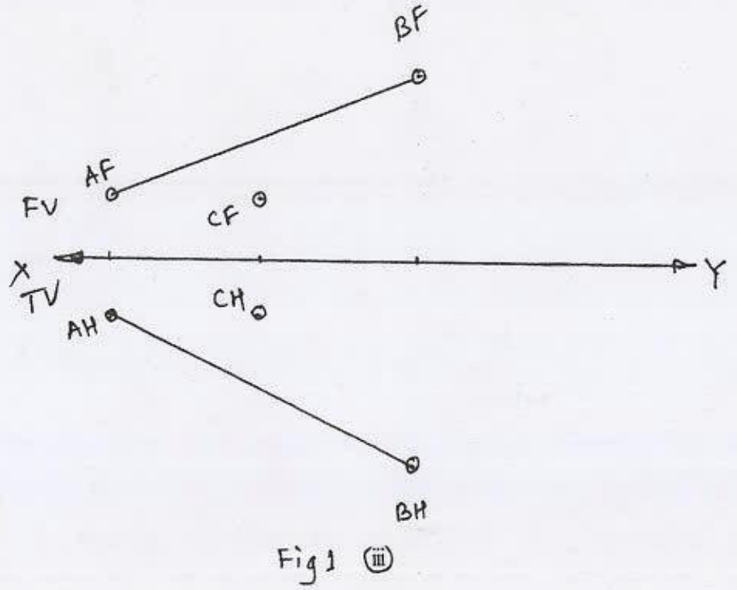


Fig 1 (iii)

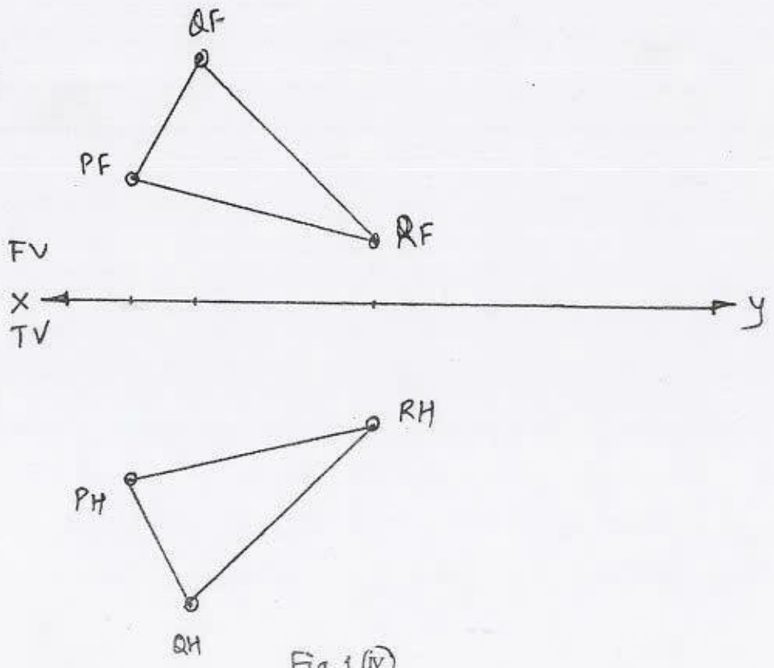


Fig 1 (iv)

Q.No.	1	2	3	4	5	6	Signature of the Examiner
Marks							

Sr. No. | Signature of Jr. Supervisor

Examination : _____ Paper No. _____ Section _____

Subject | Code No.

SHIVAJI UNIVERSITY, KOLHAPUR

Name of Exam : _____ | Code No.

Paper No. _____ Section _____

Seat No. _____ Centre _____

SF-3

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester- I & II) (Revised)
Examination, November - 2017
ENGINEERING CHEMISTRY
Sub. Code : 59183

Day and Date : Tuesday, 07-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Assume suitable data wherever necessary.**
3) **Draw neat labeled diagram wherever necessary.**
4) **Figures to the right indicate full marks.**

SECTION-I

Q1) a) A sample of water on analysis was found to contain the following salts: **[8]**

Salt	Salt mass in mg/lit.	Mol. Wt.
$Ca(HCO_3)_2$	26.2	162
$Mg(HCO_3)_2$	21.9	146
$CaCl_2$	23.0	111
$MgSO_4$	36.0	120
NaCl	28.5	58.5

Calculate temporary, permanent and total hardness of sample in degree French.

b) Solve any two questions: **[10]**
i) What are the advantages and disadvantages of instrumental methods of analysis?
ii) Explain properties and applications of ERP.
iii) Explain reverse osmosis process for purification of water.

Q2) a) Explain the principle, construction and working of glass electrode. **[6]**

b) Solve any TWO of the following: **[10]**
i) What is scale and sludge formation? Explain mechanism of scale formation.
ii) Give preparation, properties and applications of Bakelite.
iii) What are composite materials? Explain the characteristics of composite materials.

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)3) Solve any four of the following: [16]

a) Write the applications of gas chromatography.

b) What is Dissolved Oxygen of water? Explain in detail.

c) State and derive an equation for Lambert's law.

d) Explain any four applications of nanomaterials.

e) Explain the addition and condensation polymerization reaction with suitable example.

f) Write note on acidity of water.

SECTION-II

)4) a) Solid fuel weighing 1.097gm and containing C = 90.7%, H = 6.7% and ash = 2.6%. Have the following results in the Bomb calorimeter experiment:

Water equivalent of calorimeter = 1230gm, Amount of water taken = 3376gm,

Initial temp. of water= 27.6°C, Correction due to acids = 68.7 cal.,

Cooling correction = 0.066 °C, Final temp. of water = 33.9°C,

Correction due to fuse wire = 9.0cal.

Calculate the gross and net calorific values of the solid fuel in Joule.[8]

b) Attempt any two questions: [10]

i) What is corrosion? Explain chemical corrosion with suitable diagram.

ii) How will you determine calorific value of liquid fuel?

iii) What is an alloy? Explain the purposes of alloying with suitable example.

)5) a) What are non ferrous alloys? Explain the nickel alloy giving their composition, properties and uses. [6]

b) Solve any two of the following: [10]

i) Compare of liquid fuel between gaseous fuels.

ii) Describe hydrogen evolution mechanism in wet corrosion with suitable diagram and reactions.

iii) Explain the factors influencing on the rate of corrosion.

)6) Answer of the following four questions: [16]

a) Explain in detail any four characteristic of a good fuel.

b) Discuss the importance of design in controlling corrosion.

c) Explain any four applications of Fuel Cells in various fields.

d) State composition, properties and uses of Duralumin.

e) Explain process of electroplating for prevention of corrosion.

f) Write short note on green chemistry.

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Total No. of Pages : 2

Seat No.	

B.E. (CSE) (Part - IV) (Semester - VII) (Revised)
Examination, November - 2017
DISTRIBUTED SYSTEMS
Sub. Code : 67542

Day and Date : Monday, 13-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Question 4 and question 8 are compulsory, attempt any two questions from que.1 to 3 from section I and que. 5 to 7 from section II.**

2) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) Explain the process of binding a client to a server in DCE RPC. **[8]**

b) What are different scaling techniques can be applied to achieve scalability in distributed system? **[8]**

Q2) a) Explain token ring mutual exclusion algorithm in detail. **[8]**

b) Define the terms error and fault. Classify and explain the faults. **[8]**

Q3) a) Explain UNIX semantics, Session Semantics and Immutable files semantics of file sharing. **[8]**

b) Explain the server replication mechanism used in CODA. **[8]**

Q4) Attempt any three **[18]**

a) Sensor networks.

b) Berkeley Algorithm.

c) Collaborative distributed systems.

d) Compound procedures used in ONC RPC in NFS v4.

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SECTION-II

Q5) a) Describe implementation level of virtualization in Cloud Computing? **[8]**

b) What is the benefits using virtualization in Cloud Computing? **[8]**

Q6) a) Explain virtualization at Application level? **[8]**

b) Explain Database as a Service (DBaaS) in Cloud Computing? **[8]**

Q7) a) What are different threats on Data stored in cloud? **[8]**

b) What are the advantages of "Platform as a Service" (PaaS)? **[8]**

Q8) Write note on **[18]**

a) Advantages of Using cloud storage gateways (CSG).

b) Cloud Firewall.

c) Virtual Firewall.

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Total No. of Pages : 2

Seat No.	

B.E. (CSE) (Part-IV) (Semester-VII) (Revised) Examination, November - 2017
ADVANCED DATABASE SYSTEMS
Sub. Code : 67543

Day and Date : Wednesday, 15-11-2017 **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Attempt any three questions from each section.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data wherever necessary.**

SECTION-I

Q1) a) What do you mean by replication and fragmentation w.r.t. distributed database? Briefly explain the advantages and disadvantages to replication. **[8]**

b) What are transaction-server systems? For data server systems, explain the following **[8]**
i) Locking
ii) Data caching
iii) Lock caching

Q2) a) What is an Object Identity? Explain the system-generated OID and the immutability Property of an object. **[8]**

b) What is Persistent object? Explain the approaches to make the Object Persistent? **[8]**

Q3) a) State some of the object database features that have been included in SQL. Also give an example of UDTS in SQL to create complex structured object. **[8]**

b) With the help of an appropriate figure of the database life cycle, explain in detail database initial study phase. **[8]**

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Q4) Write short notes on any three: [18]

a) 2-phase commit

b) ODL

c) Persistence

d) top-down versus bottom-up design

SECTION-II

Q5) a) Explain the intuition behind the two rules in the Bell-LaPadula model for manadatory access control. [4]

b) Give an example of how covert channels can be used to defeat the Bell-LaPadula model. [4]

c) Explain the statistical database security. [8]

Q6) a) Explain document type definition. Describe a DTD with suitable example for an XML. [8]

b) Write the applications of XML. [4]

c) What is Xquery? Explain FLOWR expression with example? [4]

Q7) a) What is data warehouse? What is the difference between data warehouse and operational database system? [6]

b) Explain Following [4]

i) Data cube

ii) OLAP

c) With neat schematic explain business intelligence architectural components? [6]

Q8) Write a short note on(any three) [18]

a) Polyinstantiation

b) XML schema

c) Classification algorithm

d) Grant and Revoke with example.

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Total No. of Pages : 3

Seat No.	

B.E. (Computer Science and Engineering) (Semester-VII) Examination, November - 2017

MOBILE APPLICATIONS (El. - 1)

Sub. Code : 67546

Day and Date : Tuesday, 21 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m to 5.30 p.m.

Instructions :
1) **Figures to the right indicates full marks.**
2) **Question no 4 and 8 are compulsory**
3) **Attempt any two questions from remaining questions in each section**

SECTION - I

Q1) a) What are mobile website navigatation techniques **[6]**

b) What is native app, hybrid app and web app in mobile app technology stack. **[6]**

c) Explain about standard OMA. **[4]**

Q2) a) Write a note on HTML 5. **[6]**

b) Explain in detail about WAP 1.0 **[6]**

c) Write short note on Web Services **[4]**

Q3) a) Explain the difference between XML and JSON **[6]**

b) What are the best practices while designing a mobile website? **[6]**

c) Explain in detail about Fallback mechanism. **[4]**

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Q4) Write short note on (Any Three) **[18]**

a) Android emulator

b) W3C

c) RESS

d) Tools for Mobile Web Development

SECTION - II

Q5) a) Explain the role of responsive images in mobile application development How we can use Sencha. IO to create responsive images **[6]**

b) Explain various problems mobile application developer face regarding feature support on a particular platform. Briefly describe their solutions. **[6]**

c) Describe how we can use HTTP header for device detection at server side **[4]**

Q6) a) Explain in detail JavaScript APIs for handling touch and gesture events in mobile application **[6]**

b) Compare Zepto.js with jQmobi. **[6]**

c) What is J2ME? How are the tools available for J2ME programming? **[4]**

Q7) a) Describe how W3C Geolocation API is used for getting a location as well as tracking a particular location. **[6]**

b) Compare Native App And Mobile Web App. **[6]**

c) List various JavaScript mobile UI patterns. Explain ANY one. **[4]**

Q8) Write a short note on (any three) **[3×6=18]**

a) Web Sockets.

b) Device Interaction.

c) GSMA One API.

d) HTTP Sniffing.

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Total No. of Pages : 2

Seat No.	

B.E. (Computer Science & Engg.) (Semester - VIII) (Revised) Examination, November - 2017

DATA ANALYTICS

Sub. Code : 67824

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Q.4 & Q.8 are compulsory.**
3) **Attempt any two questions from Q.1, to Q.3 and from Q.5 to Q.7.**

Q1) a) Explain the phases in the developments of Business Intelligence System with the help of neat diagram? **[8]**

b) Explain Star Schema, Snowflake Schema, Galaxy Schema with proper example? **[8]**

Q2) a) Explain different categories of mathematical models for decision making? **[8]**

b) Explain in detail process of univariate analysis? **[8]**

Q3) a) Explain HDFS Architecture and the working of Hadoop Heartbeat message in HDFS with proper figure? **[8]**

b) Explain data validation process in data preparation. **[8]**

Q4) Write a note on (Attempt Any Three) : **[18]**

a) Data Warehouse Architecture.

b) Hive, HBase, Pig & Pig Latin.

c) Multivariate Analysis.

d) Data mining tasks.

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Q5) a) Explain simple linear regression model and structure of regression model. **[8]**

b) Discuss the structure and phases of the learning process for a classification with a neat diagram. **[8]**

Q6) a) Explain in detail any one algorithm used for partition methods. **[8]**

b) Explain the general association rules that is useful for range of applications. **[8]**

Q7) a) List and explain the different functions to handle the data in R workspace with an example. **[8]**

b) List and explain the various types of R commands to import data. **[8]**

Q8) Write a short note on (Any Three) : **[18]**

a) Bayesian methods.

b) Exporting data from R.

c) Hierarchical clustering methods.

d) Apriori algorithm.



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Seat No.	

B.E. (Computer Science) (Semester - VIII) (Revised) Examination, November - 2017
REAL-TIME OPERATING SYSTEM
Sub. Code:67826

Day and Date :Friday, 03 - 11 - 2017 **Total Marks : 100**
Time :10.00 a.m. to 1.00 p.m.

Instructions : 1) **Solve Any Three Questions from each section.**
2) **Figures to right indicate full marks.**

SECTION-I

Q1) a) What is Real-Time System? Explain Real-time system examples. **[8]**

b) Explain following terminologies related to hardware interfacing: **[8]**

i) Latching

ii) Edge vs Level Triggered

iii) Tristate logic

iv) IEEE 1394 Firewire

Q2) a) Explain memory-mapped I/O with suitable diagram. **[8]**

b) Explain operation of mailboxes? How critical section problem can be handled using mailboxes? **[8]**

Q3) a) What is priority inversion ? Explain priority ceiling protocol. **[8]**

b) Explain task control block model in detail. **[8]**

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Q4) Write a note on- (Any Three) **[18]**

a) Polled loop

b) Test-and-Set-Instruction

c) Watchdog timers

d) Ring Buffers

SECTION -II

Q5) a) Explain requirement engineering process in desing of real time systems. **[8]**

b) What are formal methods in software specification? State its limitations. **[8]**

Q6) a) Explain how to organize the requirements document. **[8]**

b) What is COCOMO? Explain COCOMO-II in detail. **[8]**

Q7) a) Explain real-time features of C# and Java. **[8]**

b) Explain semaphore and mutex management in RTLinux. **[8]**

Q8) Write a note on-(Any Three) **[18]**

a) Mc Cabe's Metric

b) Function points

c) RTLinux

d) Assembly language

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Total No. of Pages : 2

Seat No.	

B.E. (Computer Science and Engg.) (Semester-VIII)
(Revised) Examination, November - 2017
SOFTWARE TESTING AND QUALITY ASSURANCE
(Elective-II)
Sub. Code : 67828

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **Q. 4 and Q. 8 are Compulsory.**
2) **Attempt any two questions from Q. 1 to Q. 3.**
3) **Attempt any two questions from Q. 5 to Q. 7.**

SECTION-I

Q1) a) What is software testing? Why should we test? **[8]**

b) Explain V shaped software lifecycle model. **[8]**

Q2) a) What are different software verification methods? **[8]**

b) What do you mean by software project audit? Explain in brief project audit and review checklist. **[8]**

Q3) a) Explain use cases and use case diagram in detail? **[8]**

b) What is regression testing? **[8]**

Q4) Write a note on (Any two): **[18]**

a) Software failures with example.

b) SRS document verification.

c) Risk analysis.

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SECTION-II

Q5) a) Which are broad categories of software metrics? Explain in detail. **[8]**

b) Compare client server application and web based application. **[8]**

Q6) a) What should we measure during testing? **[8]**

b) Write a note on user interface testing. **[8]**

Q7) a) Which are the several problems with the function points measure? **[8]**

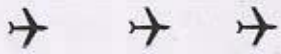
b) What is automated test data generation.? **[8]**

Q8) Write a note on (Any two): **[18]**

a) Measurement in software engineering.

b) Albretch's approach.

c) Security testing.



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Seat No.	

B.E. (Computer Science & Engg.) (Semester - VIII) (Pre-revised) (Old) Examination, November - 2017

GRID TECHNOLOGY

Sub. Code : 49447

Day and Date : Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **Q.4 & Q.8 are compulsory.**
2) **Attempt any two questions from Q.1, Q.2, Q.3.**
3) **Attempt any two questions from Q.5, Q.6, Q.7.**
4) **Figures to the right indicate full marks.**

SECTION - I

Q1) a) With schematic explain basic structure of GT3 and their base services. **[8]**

b) What is grid computing? What are the types of grid computing? Explain different topologies of grid computing? **[8]**

Q2) a) Explain semantic workflow enactment in geodise. **[8]**

b) What is autonomic computing? Explain the features of autonomic computing? **[8]**

Q3) a) What is RDF? Why RDF is essential in GRID? Explain RDF data model. **[8]**

b) Define web service and explain the structure of soap and wsdl. **[8]**

Q4) Write a short note on (Any Three) : **[18]**

a) Grid related standard bodies.

b) Portal Lab.

c) RPC.

d) OGSA and OGSI.

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SECTION - II

Q5) a) Explain the role of directory service, producer and consumer in GMA? **[8]**

b) With neat schematic explain different daemons in condor pool. **[8]**

Q6) a) Explain cloud deployement models? Discuss about pros and cons cloud computing? **[8]**

b) What is virtualization? What are the characteristics of virtualization? Explain foundational issues of virtualization. **[8]**

Q7) a) What is storage as a service provider? Explain different aspects of data security. **[8]**

b) Explain Job life cycle and Job Management in Codor. **[8]**

Q8) Write a short note on (Any Three) : **[18]**

a) SOA.

b) Credential delegation & single sign-on.

c) Client Desktop.

d) Scheduling Paradigms.

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Total No. of Pages : 2

Seat No.	

T.E. (Computer Science & Engineering) (Semester-V) (Revised) Examination, November - 2017

COMPUTER GRAPHICS (Theory)

Sub. Code : 66293

Day and Date : Thursday, 09-11-2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Q. No. 3 and Q. No. 6 are compulsory. Attempt any one from Q. No. 1 and Q. No. 2 and any one from Q. No. 4 and Q. No. 5.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data if necessary.**

Q1) a) What is scaling? Explain in detail 2D scaling transformation. **[6]**

b) Write and explain Bresenham's line drawing algorithm in first octant. **[6]**

Q2) a) Explain in detail the rotation of object about the arbitrary axis in space. **[6]**

b) Explain Run Length Encoding (RLE) scan conversion method. **[6]**

Q3) a) Explain midpoint subdivision algorithm for line clipping with example. **[7]**

b) Write a note on windowing and view porting. **[6]**

Q4) a) Explain parametric representation of cubic spline curve segment. **[6]**

b) What is key frame animation? Explain different methods of key frame animation. **[6]**

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Q5) a) Explain diffuse reflection model for calculating surface intensity at a given point. **[6]**

b) What is halftoning. Explain halftone approximation method for a 3 by 3 pixel grid on a bilevel system. **[6]**

Q6) a) Explain Warnock algorithm for hidden surface removal. **[7]**

b) What is warping? Explain feature-based image warping method. **[6]**

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Total No. of Pages :2

Seat No.	

T.E. (Computer Science and Engg.) (Semester - V) Examination, November - 2017

SYSTEM PROGRAMMING

Sub. Code: 66294

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **Question No. 4 and 8 are compulsory.**
2) **Answer any two questions from Question No. 1, 2 and 3.**
3) **Answer any two questions from Question No. 5, 6 and 7.**
4) **Figures to right indicate full marks.**

Q1) a) Explain the fundamentals of language specification. **[8]**

b) Explain Pass I of a two pass assembler. **[8]**

Q2) a) State and discuss the advanced macro facilities with an example each. **[8]**

b) Discuss language processing activities in detail. **[8]**

Q3) a) List and discuss elements of assembly language programming **[8]**

b) Explain different data structures of the macro preprocessor with its contents in detail. **[8]**

Q4) Write a short note on (6 marks each): **[18]**

a) Macro Expansion.

b) Intermediate Code Forms.

c) LEX and YACC LPDT's.

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Q5) a) Explain use of Interpreters. What are Pure and Impure Interpreters? **[8]**

b) Explain code optimization in compilation. Brief about Local and Global code optimization. **[8]**

Q6) a) Give the Structure of UI with neat diagram. **[8]**

b) Write and Explain Linking Algorithm. **[8]**

Q7) a) Explain about the Tools used in Enhancement of Program Performance. **[8]**

b) What is Command Dialog? Explain ways to implement Command Dialogs. **[8]**

Q8) Write a short note on: (Solve any three: each carries 6 marks.) **[18]**

a) Program Development.

b) Two passes of Linker.

c) Program Relocation.

d) Memory Allocation in Compilers.

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Total No. of Pages : 2

Seat No.	

T.E. (Computer Science and Engineering) (Part - III) (Semester-V) (Revised) Examination, November - 2017

OBJECT ORIENTED MODELING AND DESIGN (Theory)

Sub. Code : 66295

Day and Date : Tuesday, 14-11-2017 Total Marks : 50

Time : 9.30 a.m. to 11.30 a.m.

Instructions : 1) All the questions are compulsory, Provided internal options in each question.

2) Figures to the right indicate full marks.

Q1) Attempt any two questions out of three. [7 × 2 = 14]

a) Explain OMT models in detail.

b) Explain the following terms

i) State generalization

ii) Control Flows

c) Write note on - Design associations

Q2) Attempt any two questions out of three. [6 × 2 = 12]

a) Explain the following terms.

i) Generalization

ii) Class Descriptors

b) Draw and explain Event trace diagram for ATM Scenario.

c) Explain the impacts of Object Oriented Approach.

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Q3) Attempt any two questions out of three. **[6 × 2 = 12]**

a) Explain Structural things of UML.

b) Explain kinds of events with respect to behavioural modeling.

c) Explain deployment diagram, its contents and uses.

Q4) Attempt any two questions out of three. **[6 × 2 = 12]**

a) Explain class diagram, its properties, contents and common uses.

b) Explain following terms with respect to activity diagram.

i) Action states

ii) Transitions

iii) Branching

c) Write a note on - frameworks.

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Total No. of Pages : 2

Seat No.	

T.E. (CSE) (Semester - V) (Revised) Examination, November - 2017
NETWORK TECHNOLOGIES
Sub. Code : 66297

Day and Date : Wednesday, 22 - 11 - 2017 **Total Marks : 50**

Time : 9.30 a.m. to 11.30 a.m.

Instructions :
1) **Question Number One is compulsory.**
2) **Attempt any THREE questions from Question No. TWO to FIVE.**
3) **Figures to the right indicate full marks.**
4) **Assume data wherever necessary.**

Q1) a) Explain issues in designing a MAC protocol for AD HOC Wireless Networks. **[6]**

b) Explain FCCH and SCH channels in GSM operation. **[4]**

c) What is VPN? Explain VPN protocols. **[4]**

Q2) a) What is GSM? Explain the role of HLR and VLR in GSM service operations. **[6]**

b) What is Handoff operations? Explain inter BSC handoff. **[6]**

Q3) a) What is WLAN? Explain various standards in WLAN defined by IEEE. **[6]**

b) Explain sensor network node architecture. **[6]**

Q4) a) Draw and explain Bluetooth piconet architecture. **[4]**

b) Explain WEP protocol. **[4]**

c) How sensor network is useful in environmental monitoring. **[4]**

Q5) a) What is location updating in GSM. Explain various steps involved in normal location updating. **[6]**

b) Compare WLAN and WPAN networks. **[3]**

c) Explain necessity of security in wireless network. **[3]**

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Total No. of Pages : 2

Seat No.	

T.E. (Computer Science and Engineering) - II (Semester - VI) Examination, November - 2017

OPERATING SYSTEM - II

Sub. Code : 66859

Day and Date : Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **Figures to the right indicate full marks.**
2) **Solve any two questions from Q.1 to Q.3.**
3) **Solve any two questions from Q.4 to Q.6.**

Q1) a) Explain the architecture of UNIX System Kernel. **[8]**

b) Explain scenarios for retrieval of a buffer from the buffer cache. **[10]**

c) What is Inode? List Fields from disk inode. **[7]**

Q2) a) Calculate the Maximum size of a file in the UNIX system, if disk block size is 512 byte and a block is identified by 32 bit integer. **[8]**

b) What is remembered inode? How is it useful in inode assignment to a file? **[8]**

c) Explain Following System calls: **[9]**

i) Open.

ii) Read.

iii) Pipe.

Q3) a) Explain the use of User File Descriptor Table, File Table and Inode Table in UNIX File system. **[8]**

b) Explain bwrite algorithm. **[7]**

c) What is Super Block? List fields from the Super Block. **[5]**

d) Explain the structure of a directory file in UNIX. **[5]**

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Q4) a) Explain the context of a process. **[8]**

b) Explain the process state transition in UNIX. **[8]**

c) Explain the algorithm for handling the interrupt. **[9]**

Q5) a) What is a signal? Explain checking and handling of the signal. **[8]**

b) Explain the real and effective user ID of a process. **[9]**

c) Explain the process scheduling parameters in UNIX. **[8]**

Q6) a) Explain allocation of Swap space. **[8]**

b) Explain page stealer process. **[8]**

c) Explain switch table in device driver interface. **[9]**

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Seat No.	

T.E. (CSE) (Part -III) (Semester - VI) (Revised) (Theory) Examination, November - 2017
DATABASE ENGINEERING
Sub. Code:66860

Day and Date :Friday, 03 - 11 - 2017 **Total Marks :50**
Time :2.30 p.m. to 4.30 p.m.

Instructions : 1) **All the questions are compulsory. Provided internal options in each question.**

2) **Figures to the right indicate full marks.**

Q1) Attempt any two questions out of three **[2×7=14]**

a) Give advantages and disadvantages of DBMS

b) Write SQL queries to perform given tasks on following schema

Sailors (sid: integer, sname: string, rating: integer, age: real)

Boats (bid: integer, bname: string, color: string)

Reserves (sid: integer, did: integer

i) Find the names of sailors who have reserved at least one boat.

ii) Find the names of sailors who have not reserved a red boat.

iii) Find the name and age of the oldest sailor.

iv) Find the age of youngest sailor who is at least 18 years old.

c) What is functional dependency? Give different types of functional dependencies.

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Q2) Attempt any two questions out of three. **[2×6=12]**

a) Compare database systems with traditional file based systems.

b) Explain different Data Definition Language (DDL) Statements.

c) Explain Third Normal From and Boyce-Codd Normal Form.

Q3) Attempt any two questions out of three. **[2×6=12]**

a) What are the different physical storage media used for data storage?

b) Explain Two-Phase Locking Protocol for Concurrency Control.

c) Explain how records can be organized in files.

4) Attempt any two questions out of three. **[2×6=12]**

a) Compare Dense and Sparse indices

b) Explain Optimistic Concurrency Control Mechanism.

c) Explain Log-based Recovery Mechanism.

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T.E. (CSE) (Part - II) (Semester - VI) Examination, November - 2017

INFORMATION SECURITY

Sub. Code: 66862

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 50**

Time : 2.30 p.m. to 4.30 p.m.

Instructions :
1) **Q.3 and Q.4 are compulsory.**
2) **Solve any one out of Q.1, Q.2 and Solve any one out of Q.5, Q.6.**
3) **Assume suitable data wherever necessary.**

Q1) a) List & Explain the security services defined in X.800. **[6]**

b) Explain the DES encryption with neat block diagram. **[6]**

Q2) a) Explain the RSA algorithm. Perform encryption & decryption using RSA algorithm **if p=11, q=3, e=11, M=7** **[6]**

b) What is Message Authentication Code? Explain generation of MAC based on DES. **[6]**

Q3) a) Compare **[6]**

i) Symmetric and Asymmetric ciphers

ii) Differential and Linear cryptanalysis

b) Explain Diffie-Hellman key exchange algorithm with example. **[4]**

c) Define the following terms w. r. t Avalanche effect: **[3]**

i) SIC

ii) BIC

iii) GA

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Q4) a) Explain in detail different approaches to Digital Signatures. **[6]**

b) What is certificate format in X.509 standard? **[7]**

Q5) a) Draw general format of PGP message and explain every field of it in detail. **[6]**

b) List types of firewalls. Explain any one in detail. **[6]**

Q6) Write a short note on any two. **[12]**

a) IPSec Authentication Header.

b) SET Participants.

c) Trusted System.

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Total No. of Pages : 3

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T.E. (CSE) (Part - III) (Semester - VI) (New) Examination, November - 2017

STORAGE NETWORKS

Sub. Code : 66861

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt any three questions from each section.**
2) **Figure to the right indicate full marks.**
3) **Assume suitable data wherever necessary.**

SECTION-I

Q1) a) Explain the following in relation with Information Lifecycle. **[8]**

i) Information Lifecycle Management (ILM).

ii) Information Lifecycle Management (ILM) Implementation.

iii) ILM Benefits.

b) The average I/O size of an application is 128 KB. The following specifications are available from the disk manufacturer: average seek time = 2.5 ms, 7,200 RPM, transfer rate = 60 MB/s. Determine the maximum IOPS that could be performed with this disk for this application. Taking this case as an example, explain the relationship between disk utilization and IOPS. **[8]**

Q2) a) Describe SCSI Command Model in direct attached storage. **[8]**

OR

a) Describe Fibre Channel Architecture. **[8]**

b) Explain Benefits of Network Attached Storage[NAS]. **[8]**

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Q3) a) Describe FCIP, FCIP Topology and FCIP Performance and Security. **[8]**

b) An application has 1,000 heavy users at a peak of 2 IOPS each and 2,000 typical users at a peak of 1 IOPS each, with a read/write ratio of 2: 1. It is estimated that the application also experiences an overhead of 20 percent for other workloads. Calculate the IOPS requirement for RAID 1, RAID 3, RAID 5, and RAID 6. **[8]**

Q4) Solve ANY TWO of the following questions.

a) Describe different RAID levels with its advantages and disadvantages. **[9]**

b) Explain Cache component of an Intelligent Storage System with following reference. **[9]**

i) Structure of Cache

ii) Read Operation with Cache

iii) Write Operation with Cache

iv) Cache Implementation

v) Cache Management

vi) Cache Data Protection.

c) Describe Data Center Infrastructure. **[9]**

SECTION-II

Q5) a) Explain Backup and Restore Operations. **[8]**

b) Describe BC Planning Lifecycle. **[8]**

Q6) a) Explain symmetric storage virtualization with its advantages and disadvantages. **[8]**

b) Describe BC Planning Lifecycle in business continuity. **[8]**

Q7) a) Explain Storage Virtualization on various levels of storage network. **[8]**

b) Describe various Backup purpose and backup considerations in storage networks. **[8]**

Q8) Solve ANY TWO of the following questions.

a) Explain Failure Analysis in BC, BC terminology and Business Impact Analysis. **[9]**

b) Explain implementation considerations in Storage virtualization. **[9]**

c) Describe different Backup Granularity and Recovery Considerations. **[9]**



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Total No. of Pages :3

Seat No.	

T.E. (CSE) (Part - III) (Semester - V) (Revised) Examination, November - 2017

COMPUTER ALGORITHMS

Sub. Code: 66296

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

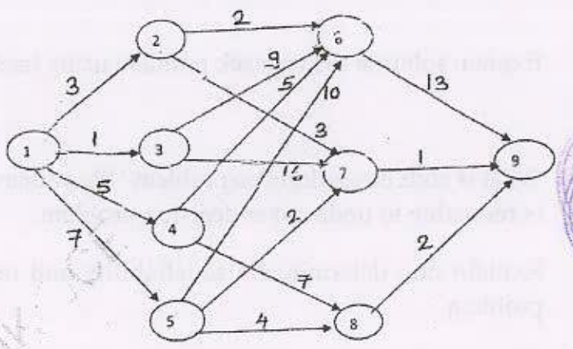
Instructions :
1) **Question No. 4 and 8 are compulsory.**
2) **Attempt any four questions from remaining questions.**
3) **Figures to the right indicate full marks.**
4) **Assume suitable data wherever necessary.**

Q1) a) Explain Job sequencing with deadlines. Also calculate the optimal solution for n=5 jobs, where profits (p1,p2,p3,p4,p5) = (100, 19, 27, 25,15) and deadlines (d1,d2,d3,d4,d5)=(2,1,2,1,3). **[8]**

b) Prove that complexity of quick sort in best case is O(nlogn) and that in worst case is $O(n^2)$. **[8]**

Q2) a) Give solution to Knapsack problem using greedy solution. **[8]**

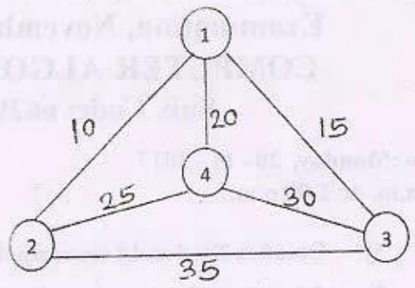
b) Find the minimum cost path from s to t in the multistage graph given below using forward approach. **[8]**



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Q3) a) Solve the instance of Travelling sales person problem to find tour of minimum cost. [8]



b) What is an Algorithm? What are the characteristics of the algorithm? [8]

Q4) Write short note on (Solve any three) [18]

a) Difference between Priori and Posteriori analysis.

b) Randomized algorithms

c) Knapsack 0/1

d) Greedy Method

Q5) a) Explain breadth first search and depth first search with suitable example. [8]

b) Explain solution to knapsack problem using back-tracking. [8]

Q6) a) What is node cover decision problem? Show that clique decision problem is reducible to node cover decision problem. [8]

b) Explain non deterministic satisfiability and non deterministic clique problem. [8]

Q7) a) What is deterministic list ranking problem in PRAM? Explain with example. [8]

b) Explain prefix sum computation with the help of Mesh and Hypercube. [8]

Q8) Write short note on: [18]

a) Hamiltonian Cycle

b) Articulation Point

c) Butterfly network.

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Total No. of Pages :3

Seat No.	

T.E. (Mechanical) (Part-III) (Semester - VI) (Revised) Examination, November - 2017

METROLOGY AND QUALITY CONTROL

Sub. Code :66839

Day and Date : Friday , 03 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume any data if necessary and state it clearly**

Q1) Solve any two of the following **[18]**

a) What is the limit gauges. Explain the 'Taylor's principle for design of 'limit gauges'

b) Explain the following terms with neat sketch.

i) Unilateral tolerance

ii) Bilateral tolerance

iii) Upper deviation

iv) Lower deviation

c) Calculate the limits of the following 25 H7 d8 designated fit, identify it and draw it graphically, the standard tolerance is given by

$i = 0.45D^{\frac{1}{3}} + 0.001D$

i) 25 lies between steps of 18-30mm

ii) Fundamental deviation of d shaft=$-16D^{0.44}$

iii) for grade IT7 tolerance = 16i and for IT8 tolerance=25i

iv) Fundamental deviation of H-hole=0

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Q2 Solve any two of the following [16]

a) Compare mechanical comparator with optical comparator with the help of neat sketches.

b) Explain the use of sine bar for measuring an angle with the help of neat sketch and state its limitations.

c) Explain construction, working and limitations of sigma comparator.

Q3) Solve any two of the following [16]

a) Define straightness and flatness. Briefly explain how straightness and flatness is measured and specified.

b) Explain principle and working of Tomlinson's surface meter with neat sketch.

c) Define surface texture, Lay and explain ten point average method for surface finish measurement.

Q4) Solve any two of the following [16]

a) Define major diameter, effective diameter and enumerate various errors in screw thread.

b) Derive an expression for effective diameter measurement by 2-Wire method for external threads.

c) Describe the gear tooth vernier caliper and explain its use for checking tooth thickness.

Q5) Solve any two of the following [16]

a) Differentiate between quality control and quality assurance.

b) What is cost of quality? Explain cost of failure, cost of appraisal and cost of prevention.

c) Discuss the factors that control, quality of design and quality of conformance.

Q6) Solve any two of the following [18]

a) State the advantages, applications of control charts and sketch different patterns of control charts

b) Discuss following acceptance sampling terms

i) Average out going quality

ii) Average out going quality level

iii) Accepted quality level

c) A machine is working to a specification 80.75± 0.1mm a study of 32 consecutive pieces shows the following measurements. Construct the $\overline{X}$ and R chart and calculate process capability (For sample size of 8 take A_2 =0.37, D_4 =1.86, D_3 =0.14,d_2=2.847)

1st day	2nd day	3rd day	4th day
80.74	80.76	80.77	80.73
80.73	80.76	80.72	80.75
80.72	80.75	80.77	80.81
80.74	80.73	80.71	80.77
80.74	80.75	80.73	80.74
80.76	80.75	80.74	80.74
80.78	80.77	80.76	80.80
80.78	80.77	80.80	80.81

& & &

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Total No. of Pages :3

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T.E. (Mechanical) (Semester - VI) (Revised) Examination, November - 2017
INDUSTRIAL FLUID POWER
Sub. Code: 66838

Day and Date :Thursday, 02 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Draw neat diagrams/sketches wherever necessary.**
3) **Figures to right indicates full marks.**

Q1) Solve any two:

a) Explain in brief the basic requirements of a Pneumatic system. **[7]**

b) Explain the important properties of hydraulic fluids. **[7]**

c) Draw the symbols and explain the function of the following elements:**[7]**

i) F.R.L unit

ii) Four way, three position-open center solenoid operated D.C valve.

iii) Weight loaded Accumulator.

iv) time delay valve.

Q2) Solve any three:

a) Explain the working of swash plate type axial piston pump with neat sketch. **[6]**

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b) Explain the function of cushioning in cylinders with neat sketch. **[6]**

c) Explain fluid conditioning and also explain with neat symbols types of reservoirs. **[6]**

d) Classify intensifiers and explain any one of them. **[6]**

Q3) Solve any three:

a) Draw a schematic of 4/2 pilot operated DCV and briefly explain its function. **[6]**

b) Draw schematically a sequence valve and explain its function. **[6]**

c) Explain the working of pressure compensated flow control valve with neat sketch. **[6]**

d) Explain use of any two center positions of D.C valves in hydraulic circuits. **[6]**

Q4) Solve any three:

a) Explain with neat sketch working of screw compressor used in pneumatic systems. **[6]**

b) Explain schematically different piping layouts in Pneumatic systems. **[6]**

c) Explain with the help of neat sketch the construction and working of air motor. **[6]**

d) Explain the working of 5/2 Direction control valve with a neat sketch. **[6]**

Q5) Solve any Three.

a) A vehicle is raised and held for about five hours and is to be descended slowly without any jerks, suggest and draw a suitable hydraulic circuit for the same. **[6]**

b) Explain the speed control circuit for an air motor. **[6]**

c) With the aid of circuit diagram explain the use of shuttle valve in pneumatic circuit. **[6]**

d) Explain with circuit diagram travel dependent sequencing mechanism in hydraulic system. **[6]**

Q6) Write short notes on: (Solve any two)

a) Pneumatic servo system. **[7]**

b) Safety precautions in handling hydraulic systems. **[7]**

c) Fluidics. **[7]**

What will be your decision under the following approaches

i) Optimistic Criterion

ii) Pessimistic Criterion

iii) Leplace Criterion

iv) Hurwicz Criterion ($\alpha = 0.7$)

c) Draw the project network for the following activities and determine critical path and project duration.

Activity	Preceding activity	Duration (days)
A	-	8
B	A	12
C	A	8
D	B,C	7
E	A	8
F	D,E	17
G	C	21
H	F,G	9
I	H	11

d) Determine optimal sequence, elapsed time and idle time of the following six jobs on the machine M1,M2 and M3 used in the same sequence to process these jobs.

	Jobs					
Machines	J1	J2	J3	J4	J5	J6
M1	15	14	16	13	10	8
M2	8	10	7	15	11	9
M2	8	10	7	15	11	9

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Seat No.	

T.E. (Mechanical) (Part - II) (Semester - VI) (Revised) Examination, November - 2017

INDUSTRIAL MANAGEMENT & OPERATIONS RESEARCH

Sub. Code: 66837

Day and Date :Wednesday, 01 - 11 - 2017 **Total Marks : 100**

Time :2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume suitable data, if necessary.**
4) **All questions are to be solved on one answer book only.**

Q1) Attempt any four (5 Marks Each) **[20]**

a) State the need of planning in manufacturing a component from vendors.

b) Explain in brief Process of Organizing.

c) Is there any difference between Authority & Responsibility. Justify your answer with suitable example.

d) Discuss the implications of the Herzberg's theory as a strategy for motivating employees.

e) Whether controlling is an essential function of management? If yes then explain the steps involved in controlling process?

Q2) Attempt any two (6 Marks Each) **[12]**

a) Which factors related to environmental influence sugar manufacturing industry?

b) What are the problems of SSI involved in manufacturing components of automobile sector?

c) How to prevent an accident in a gas welding section of fabrication unit? Does the purchasing of safety equipments increases cost of operation?

Q3) Write short notes on any three (6 Marks Each) **[18]**

a) Types of markets

b) 4 P's of market

c) Functions of Purchase department

d) Purchase policy and procedure

e) Cost estimation

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Q4) Attempt any three (6 Marks Each) **[18]**

a) Define Operations Research. Briefly explain the characteristics of Operations Research.

b) Use graphical method to solve the following,

Maximize $Z = 5X_1 + 4X_2$

Subjected to constraints,

$5X_1 + 2X_2 \leq 40$,

$3X_1 + 3X_2 \leq 30$

$3X_1 + 5X_2 \leq 45$

$X_1, X_2 \geq 0$.

c) A company manufactures three jobs namely X, Y and Z. Each of the product require processing on three machines, Turning, Milling and Drilling. Product X requires 5 hours of turning, 2 hours of milling and 20 minutes of drilling. Product Y requires 3 hours of turning, 5 hours of milling and 30 minutes of drilling, and Product Z requires 1 hour of turning, 2 hours of milling and 30 minutes of drilling. In the coming planning period, 270 hours of turning, 220 hours of milling and 50 hours of drilling are available. The profit contribution of X,Y and Z are Rs. 500, Rs.750 and Rs. 1000 per unit respectively. Formulate LPP to maximize the profit. Suggest suitable method for solution of LPP.

d) Use simplex to solve the following problem and obtain initial and second feasible solution (two simplex tables only)

Minimise $Z = 5X_1 + 3X_2 + 2X_3$

subjected to constraints,

$3X_1 + 2X_2 + 2X_3 \leq 120$,

$2X_1 + 3X_2 + 3X_3 \leq 240$

$X_1, X_2, X_3 \geq 0$.

Q5) Attempt any two (7 Marks Each) **[14]**

a) How does the problem of degeneracy arise in a transportation problem? Explain how one can overcome it?

b) The unit transportation cost along with capacity and requirements from a supplier to a restaurant is as given below

Supplier	Restaurant				Capacity
	1	2	3	4	
A	25	40	75	20	4000
B	50	40	65	25	3000
C	25	50	70	40	3000
Requirements	1600	2400	3000	2000	

Obtain initial basic feasible solution by least cost method & VAM

c) A company has four workers and five jobs. Expected profit in Rs. for each job when assigned to different workers is given in the matrix below. Solve the assignment problem & estimate the total profit

Worker	Jobs				
	A	B	C	D	E
1	60	76	48	99	80
2	69	82	59	71	57
3	85	90	109	69	79
4	46	62	85	75	78

Q6) Write short notes on any three (6 Marks Each) **[18]**

a) Explain the various quantitative methods that are useful for decision making under risk.

b) The following matrix gives the payoff (in Rs.) of different strategies against events.

Strategies	Events			
	E_1	E_2	E_3	E_4
S_1	4,000	100	6,000	18,000
S_2	20,000	5,000	400	0
S_3	20,000	15,000	2,000	1,000

Total No. of Pages : 3

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T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MANUFACTURING ENGINEERING

Sub. Code : 66245

Day and Date : Wednesday, 22 - 11 - 2017 Total Marks : 100

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume if necessary suitable data and state them clearly.
4) Use of non-programmable calculators is permissible.

SECTION - I

Q1) Solve any two:

a) Explain with neat sketch the types of milling cutters. [8]

b) Derive an expression for Shear strain. [8]

c) In an Orthogonal cutting of the material, Cutting force (F_H) =138Kg, Feed force (F_v) = 68Kg, Rake angle (α) =7°, Chip thickness ratio (r) = 0.4. Determine

i) Coefficient of friction of chip

ii) Shear force (Fs) and normal to shear force (Fn). [8]

Q2) Solve the following questions.

a) Define machinability. Explain the factors affecting machinability. How the machinability index is defined? [8]

OR

a) Explin concept of wear & types of wear with sketch. [8]

b) Determine [8]

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P.T.O.

i) Taylor's Tool life equation

ii) Cutting speed for 6 minutes of tool life when tool life of 70 minutes is obtained at a speed of 25m/min and 15 minutes at 40m/min.

The component shown in fig. is to be processed on a single spindle automat. Study the component and prepare: **[18]**

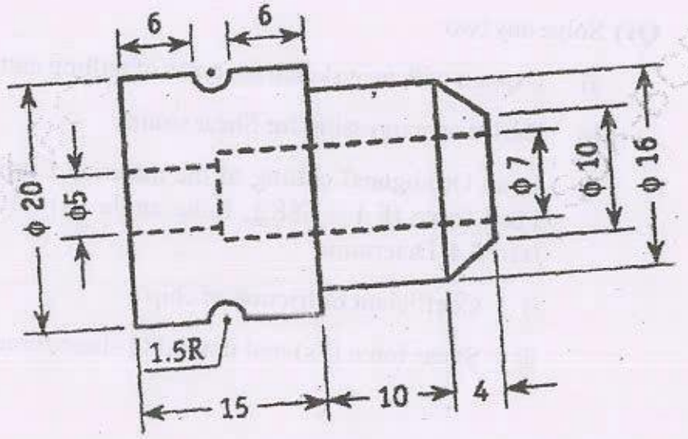
a) Detailed process sheet

b) Tool Layout

c) Cam profile for drilling operation-of ϕ5 mm hole through

d) Calculate Production rate per hour

Material –ϕ 20 Bronze bar All dimensions are in mm.



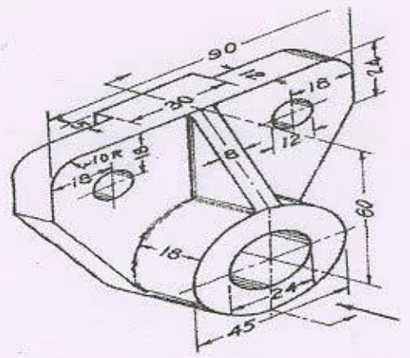
SECTION - II

Q4) Design & draw neat dimensional drawing in three views with one sectional view of jig for drilling two holes ϕ12 in the given bracket as shown in figure. **[26]**

OR

Design & draw neat dimensional drawing in three views with one sectional view of Milling fixture for creating plane surface of ϕ 24mm of the given bracket as shown in figure.

Also Justify the selection of location, clamping & guiding elements.



) Attempt any two.

a) Explain with neat sketch the Compound die. **[6]**

b) Explain types of Stock stop. **[6]**

c) Explain the importance of following in Press working **[6]**

i) Strippers

ii) Clearanace

[12]

6) Write short notes any three.

a) Construction & working of CNC.

b) Automatic Tool Changer.

c) CNC axes and drives.

d) Modular Tooling System.

Q6) a) Explain the step by step procedure for selection of V- belt from Manufacturer's Catalogue. [6]

b) It is required to select flat belt drive for a fan running at 360 rpm which is driven by a 10kW 1440 rpm motor. The belt drive is open type and space is available for a center distance of 2 m approximately. The belt should operate at velocity between 17.80 m/s to 22.90 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0118 kW. The load correction factor can be taken as 1.2. Suggest preferred pulley diameters for the motor and fan pulleys and give complete specifications of belting. Refer the tables given below. [10]

Arc of Contact Factor (F_d)

α_s(Deg)	130	140	150	160	170	180	190	200
F_d	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard Widths of these belts in mm

3–Ply	25	40	50	63	76					
4–Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

For flat pulleys: Series of preferred values of pitch diameters (in mm) are as follows.

Pitch diameter (mm):	125	132	140	150	160	170	180	0	
200	212	224	236	250	265	280	300	315	355	375
400	425	450	475	500	530	560	600	630	670	710
750	800	900	1000							

Total No. of Pages :4

Seat No.

T.E. (Mechanical) (Part - III) (Semester - V) (Revised) Examination, November - 2017

MACHINE DESIGN - I

Sub. Code: 66244

Day and Date :Monday, 20 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Make suitable assumption wherever required and state them clearly.**
4) **Use of non-programmable calculator is permitted.**
5) **Draw neat diagrams wherever necessary.**

Q1) Solve any Three: [18]

a) Summarize material selection procedure adopted for designing a machine element.

b) Name different theories of failure.Illustrate the use of theory of failure for brittle material.

c) Explain the design procedure for a turn-buckle with the help of neat sketch.

d) Write a note on design of bolted joints with load perpendicular to the axis of bolt.

Q2) a) A bell crank lever to raise a vertical load is shown in fig 2a. The vertical load to be lifted is 4500N. The lever consists of forged steel material and a pin at the fulcrum F. Assume following data for the lever material. Safe stress in tension = 75 MPa; safe stress in shear=60MPa; safe bearing pressure on pins=10N/mm². Determine the pin diameter at end P, dimensions at F and cross section Y-Y (near to fulcrum) [8]

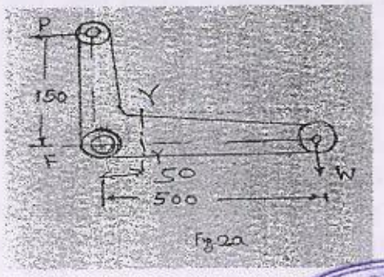
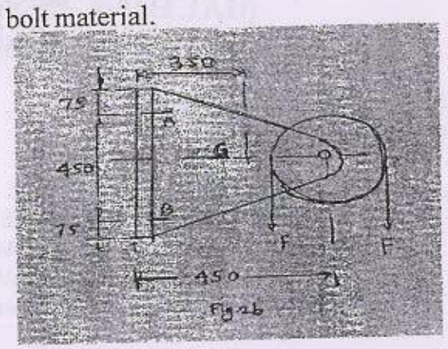


Fig 2a

P.T.O.

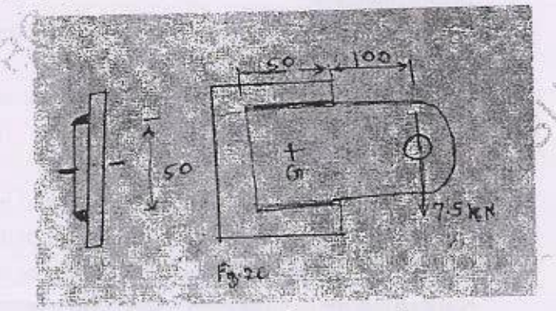
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b) Figure 2b shows a pulley bracket, which is supported by 4 bolts, two at A and two at B. The weight of pulley and bracket, W is 1850N, and the load, F on the rope is 20kN.
Determine the size of the bolts, using an allowable shear stress of 40 MPa for the bolt material. **[8]**



OR

c) A welded connection as shown in figure 2c is subjected to the eccentric force of 7.5 kN. Determine the size of welds if the permissible shear stress for the weld is 90N/mm². Assume static conditions. **[8]**



Q3) a) Discuss the design procedure for square key. **[6]**

b) A splined connection with the following particulars is used for a gear and shaft assembly in a gear box. The power to be transmitted is 20kW at 240 r.p.m. The bearing pressure on the splines is limited to 6.5.MPa during sliding. The coefficient of friction is 0.1 **[10]**
Major diameter = 60mm
Minor diameter = 54 mm
Number of splines = 10
Determine (i) The length of gear hub
ii) The force required to shift the gear.

OR

c) Design a cast iron protective type flange coupling to transmit 15 kW at 900 r.p.m. from an electric motor to a compressor. The service factor may be assumed as 1.35. The following permissible stresses may be used:
Shear stress for shaft, bolt and key material =40MPa
Crushing stress for bolt and key = 80 MPa
Shear stress for cast iron = 8 Mpa
Draw a neat sketch of the coupling. **[10]**

Q4) a) What are the various types of springs used in practice? Explain one application of each. **[6]**

b) Design a close coiled helical compression spring for a service load ranging from 2245N to 2745N. The axial deflection of the spring for this load range is 6mm. Assume a spring index of 5. The permissible shear stress intensity is 420 MPa and modulus of rigidity is 84kN/mm². Assume squared and ground ends for coil. Neglect the effect of stress concentration. Draw fully dimensioned sketch of the spring.
Std. wire gauge (SWG) number and corresponding diameter of spring wire is given in the following table. **[10]**

SWG	6/0	5/0	4/0	3/0	2/0
Diam.mm	11.785	10.973	10.160	9.490	8.839

Q5) a) Derive an expression for maximum efficiency for square threaded screw. **[6]**

OR

What is recalculating ball screw? Explain with neat sketch.

b) The power transmission screw of a screw press is required to transmit maximum load of 100 kN and rotates at 60 RPM. The trapezoidal threads are to be used as under:

Nominal Dia. mm	40	50	60	70
Core Dia. mm	32.50	41.50	50.50	59.50
Mean Dia. mm	36.50	46.00	55.50	65.00
Core Area mm²	830	1353	2003	2781
Pitch mm	7	8	9	10

The screw thread friction coefficient is 0.12. The torque required for collar friction and journal bearing is about 10% of the torque to drive the load considering screw friction. Determine screw dimensions and its efficiency. Also determine the motor power required to drive the screw. The maximum permissible compressive stress in the screw is 100 MPa. **[12]**

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Seat No.	

T.E. (Mechanical) (Part-III) (Semester-V) (Revised)
Examination, November - 2017
HEAT AND MASS TRANSFER
Sub. Code : 66243

Day and Date : Tuesday, 14-11-2017 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Assume Suitable Data wherever necessary and state it Clearly.**
4) **Use of scientific non programmable calculator is permitted.**

Q1) Solve any three:

a) Define critical radius of insulation. Also derive the equation for critical radius of insulation for hollow sphere. **[6]**

b) Explain the different modes of mass transfer. Explain with suitable examples. **[6]**

c) A 0.8m high and 1.5m wide double pane window consist of two 4mm thick layer of glass (k = 0.78 W/mK) separated by 10mm wide stagnant air space (k = 0.0626 W/mK). Determine the rate of heat transfer through this window when room is maintained at 20°C and outside air is at -10°C. Take convective heat transfer coefficient as 10 and 40 W/m²K. **[6]**

d) An aluminum pipe carries steam at 110°C. The pipe (k = 185 W/mK) has an inner diameter of 10cm and outer diameter of 12cm. The pipe is located in a room where the ambient air temperature is 30°C and convective heat transfer coefficient is 15 W/m²K. Determine heat transfer rate per unit length of pipe. Neglect convective heat transfer on steam side. **[6]**

Q2) Solve any two:

a) Derive expression for temperature distribution of a solid cylinder generating heat at the rate of q unit per unit volume. **[8]**

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b) Derive expression of temperature distribution for a solid body by using lumped heat capacity approach. **[8]**

c) A solid copper sphere of 10cm diameter (ρ = 8954 kg/m^3, C_p = 383 J/kgK, k = 386 W/mK). Initially at uniform temperature 250°C, it suddenly immersed in a fluid which is maintained at uniform temperature of 50°C. The heat transfer coefficient between sphere and fluid is 200 W/m^{2}K. Determine the temperature of copper sphere at 5 minutes after immersion. **[8]**

Q3) Solve any two:

a) Derive an expression for temperature distribution along the length of a pin fin with insulated tip. **[8]**

b) A 1m long, 5cm diameter cylinder placed in an atmosphere of 40°C is provided with 12 fins (k = 75 W/mK), 0.75mm thick, The fins protrudes 2.5cm from the cylinder surface. The heat transfer coefficient is 23.3 W/m^{2}K. Calculate the rate of heat transfer if the surface temperature of cylinder is 150°C. **[8]**

c) Determine thermal conductivity of long solid 2cm diameter rod, 1 end of the rod is inserted in a furnace while remaining portion is projected out in air at 30°C. After steady state has been reached, the temperature at two points on the rod which are 10cm apart are measured and found to be 120°C and 90°C respectively. If heat transfer coefficient is 20 W/m^{2}K. What will be thermal conductivity of the rod? **[8]**

Q4) Solve any two of the following:

a) With the help of dimensional analysis, analyze natural convection heat transfer problem. **[8]**

b) A vertical cylinder 1.5m high and 180mm in diameter is maintained at 100°C in an atmosphere environment of 20°C. Calculate heat loss by free convection from the surface of the cylinder. Assume properties of air at mean film temperature as, ρ= 1.06 kg/m^3, γ= 18.97×10^{-6}m^2/s, C_p=1.004 kJ/kg°C and k=0.0285 w/m°C, Pr = 0.708. **[8]**

Use correlation; $Nu_L = 0.10\ (Gr.Pr)^{1/3}$.

c) Air at a temperature of 20°C flows through a rectangular duct with a velocity of 10m/s. The duct is 30cm×20cm in size and air leaves at 34°C. Find the heat gain by air when it is passed through 10m long duct. The properties of air at 27°C are ρ=1.1774 kg/m^3, γ= 15.68 10^{-6}m^2/s, C_p=1057 J/kgK and k=0.03003 W/mK, Pr = 0.708. **[8]**

Use correlation ; $Nu = 0.023\ (Re)^{0.8}\ pr^{0.4}$.

Q5) Solve any two of the following:

a) Write a short notes on; **[8]**

i) Shape factor and its properties

ii) Radiation shield

b) Write plank's law and derive Stefan Boltzman law from Plank's law. **[8]**

c) The effective temperature of a body having an area of 0.12m^2 is 527°C. **[8]**

Calculate;

i) The total rate of energy emission

ii) The intensity of normal radiation

iii) The wavelength of maximum monochromatic emissive power

Q6) a) Draw the temperature distribution curve for following heat exchangers (any 3) **[6]**

i) Counter flow heat Exchanger

ii) Evaporator

iii) Parallel flow heat Exchanger

iv) Condenser

b) What are the design considerations of heat exchangers? **[6]**

c) The flow rates of hot and cold water streams running through a parallel flow heat exchanger are 0.2kg/s and 0.5kg/s respectively. The inlet temperatures of hot and cold sides are 75°C and 20°C respectively. The exit temperature of hot water is 45°C. If overall heat transfer coefficient is 325 W/m^{20}C, calculated the area of heat exchanger. Assume C_p of water 4.187 kJ/kgK. **[6]**

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b) The crank and the connecting rod of a 4 - cylinder in-line engine running at 1800 r.p.m. are 60 mm and 240 mm each respectively and the cylinders are spaced 150 mm apart. If the cylinders are numbered 1 to 4 in sequence from one end, the cranks appear at intervals of 90° in an end view in the order 1 - 4 - 2 - 3. The reciprocating mass corresponding to each cylinder is 1.5 kg. Determine:

i) Unbalanced primary and secondary forces, if any, and

ii) Unbalanced primary and secondary couples with reference to central plane of the engine. **[12]**

Q6) a) Derive expression for energy stored in a flywheel. **[6]**

b) A single cylinder double acting steam engine develops 150 kW at a mean speed of 80 rpm.The coefficient of fluctuation of energy is 0.1 and the fluctuation of speed is ± 2% of mean speed. If the mean diameter of the flywheel rim is 2 metre and the hub and spokes provide 5 % of the rotational inertia of the flywheel, find the mass and cross-sectional area of the flywheel rim. Assume the density of the flywheel material as 7200 kg/m^3. **[10]**

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Total No. of Pages :4

T.E. (Mechanical Engineering) (Part - III) (Semester - V) (Revised) Examination, November - 2017
THEORY OF MACHINES - II
Sub. Code: 66242

Day and Date :Saturday, 11 - 11 - 2017 **Total Marks : 100**

Time :10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume if necessary suitable data and state clearly.**
5) **Use of Non programmable calculator is permitted.**

Q1) a) Give the classification of Toothed Gearing and define the following terms.

i) Addendum.

ii) Module. **[8]**

OR

Derive the expression for the velocity of sliding between pair of involute teeth and define the terms.

i) PitchCircle.

ii) Diametral Pitch.

b) A pair of Spur gears with involute teeth is to give a gear ratio of 4 : 1. The arc of approach is not to less than the circular pitch and smaller wheel is the driver. The angle of pressure is 14.5°. Find

i) the least number of teeth that can be used on each wheel and

ii) the addendum of the wheel in terms of the circular pitch. **[10]**

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2) a) What are the various types of the torques in an epicyclic gear train. **[6]**

OR

Explain the concept of equivalent mass and moment of inertia applied for gear trains.

b) Fig. 2 b shows an epicyclic gear train with compound planets 'B - C', 'B' has 15 teeth and meshes with an annulus 'A' which has 60 teeth. 'C' has 20 teeth and meshes with the sunwheel 'D' which is fixed. The annulus is keyed to the propeller shaft 'Y' which rotates at 740 rad/s. The spider which carries the pins upon which the planets revolve is driven directly from main gear box by shaft 'X', this shaft being relatively free to rotate with respect to wheel 'D'. Find the speed of shaft 'X', when all the teeth have same module. When engine develops the 130 kW, what is the holding torque on the wheel 'D'? Assume 100 percent efficiency throughout. **[10]**

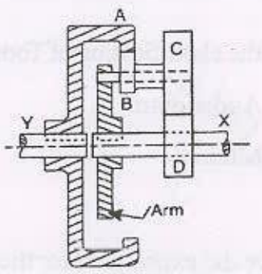


Fig. 2 b.

3) a) Condition for stability of two wheel vehicle moving in a curved path. **[6]**

b) A ship propelled by a turbine rotor which has a mass of 5 tonnes and a speed of 2100 rpm. The rotor has a radius of gyration of 0.5 m and rotates in a clockwise direction when viewed from the stern. Find the gyroscopic couple in the following conditions.

i) The ship sails at a speed of 30 km/h and steers to the left in a curve having 60 m radius.

ii) The ship pitches 6 degree above and 6 degree below the horizontal position. The bow is descending with its maximum velocity. The motion due to pitching is simple harmonic and the periodic time is 20 seconds.

iii) The ship rolls and at a certain instant it has an angular velocity of 0.03 rad/s clockwise when viewed from stern. **[10]**

4) a) Derive the equation for inertia torque analytically considering the effect of inertia of the connecting rod. **[6]**

OR

Derive an expression for velocity and acceleration of the slider of slider crank mechanism.

b) In a vertical double acting steam engine, the connecting rod is 4.5 times the crank. The weight of the reciprocating parts is 120 kg and the stroke of the piston is 440 mm. The engine runs at 250 rpm. If the net load on the piston due to steam pressure is 25 KN when the crank has turned through an angle of 120° from the top dead centre, determine the

i) thrust in the connecting rod.

ii) pressure on the slide bars.

iii) tangential force on the crank pin.

iv) thrust on the bearings.

v) turning moment on the crank shaft. **[10]**

5) a) Explain balancing of single rotating mass by two masses rotating in different planes. **[6]**

OR

Explain direct and reverse crank method for balancing of radial engine.

SUK-BCE

Q4) a) Sketch root locus plot for $G(S)\,H(S) = \dfrac{K}{S(S^2+6.S+12)}$. [12]

b) A unity feedback control system is having an open loop transfer function $G(S) = \dfrac{K(S+13)}{S(S+3)(S+7)}$. Determine the range of values of K for the system to be stable. [6]

Q5) a) Sketch the Bode plot for the transfer function $G(S) = \dfrac{1000}{S(1+0.1.S)(1+0.001.S)}$. Determine gain margin and phase margin. [10]

b) Calculate break in point and angle of departure for the control system, given by characteristic equation $S^2 + 2S + 3 + K(S+2) = 0$. [6]

Q6) a) The motion of a numerically controlled machine tool is described by the differential equation $\ddot{y} + 7.\dot{y} + 10.y = f(t)$. Determine computer diagram and state space representation using parallel method. [8]

b) The motion of robot arm controlled by an electric motor is given by the differential equation $\ddot{y} + 6.\dot{y} + 9.y = f(t)$. Use series programming to determine computer diagram. [8]

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Total No. of Pages : 4

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T.E. (Mechanical) (Semester - V) Examination, November - 2017

CONTROL ENGINEERING

Sub. Code : 66241

Day and Date : Thursday, 09 - 11 - 2017 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right Indicates full marks.**
3) **Assume any additional data if required and mention it clearly.**

Q1) a) For the mechanical system shown in Fig. 1 a, prepare grounded chair representation and construct electrical circuit using force current analog. [6]

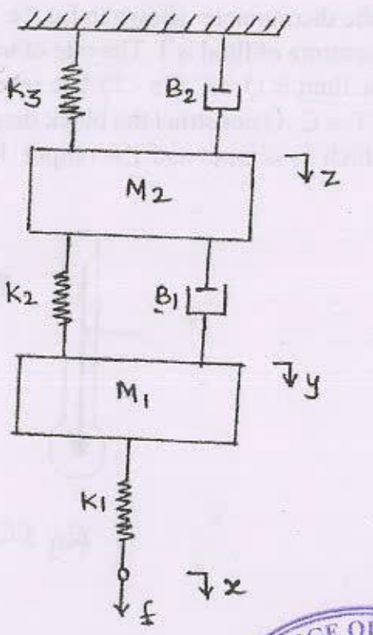


fig 1 a

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b) For the fluid system shown in Fig. 1b, determine equation of P1 in terms of P2 and P. [6]

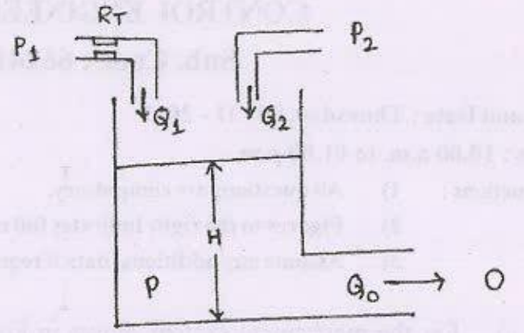


fig 1 b

c) For the thermometer shown in fig. 1c, the ambient temperature is Ts and temperature of fluid is T. The rate of heat flow from surrounding medium to the fluid is $Q = C_1(Ts - T)$ The rate of change of temperature of fluid is $D.T. = C_2.Q$ construct the block diagram representation for the system in which Ts is input and T is output. Determine time constant. [6]

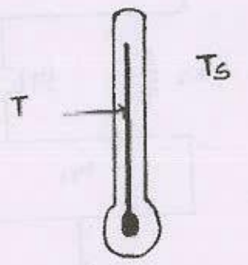


fig 1C

22) a) Determine linear approximation for the equation $Z = \sin X . \cos Y$ for $Xi = 60°$ and $Yi = 30°$, What is approximate value of Z when $X = 63°$ and $Y = 28°$. [8]

b) Reduce the block diagram shown in fig. 2b and obtain transfer function. [8]

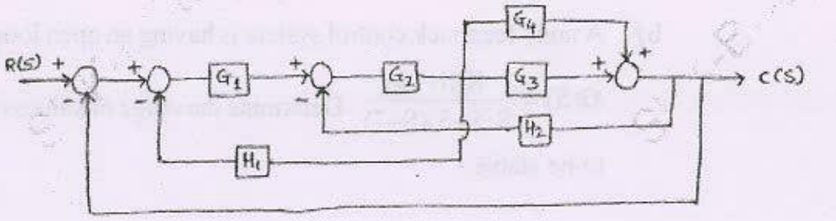


fig 2 b

23) a) A hydraulic control system is shown in fig. 3a. The forcing function is $r(t) = u(t)$ and all initial conditions are zero. Determine the response c(t) of system. [8]

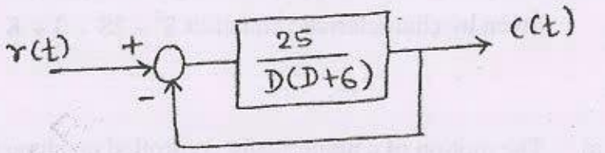


fig. 3 a

b) For the control system shown in fig. 3b, determine K_1, K_2 and a such that the system will have a steady state gain of 1, a natural frequency of 2 and damping ratio of 0.5. [8]

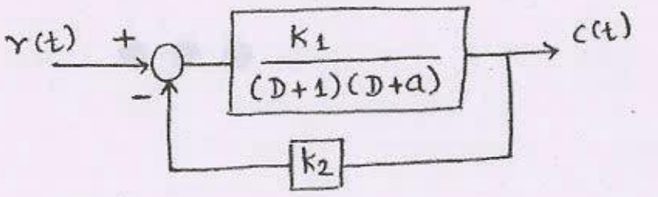


fig. 3 b

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T.E. (Mechanical Engg.) (Part - III) (Semester-VI) Examination, November - 2017

MACHINE DESIGN - II

Sub. Code : 66840

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Draw neat sketches whenever necessary.**
3) **Figures to the right indicate full marks.**
4) **Make suitable assumptions if necessary and state it clearly.**

SECTION-I

Q1) a) Define stress concentration. What are causes and remedies over stress concentration? **[8]**

OR

a) Explain the following terms in relation with design of component subjected to fluctuating loads:
   i) Endurance limit
   ii) Surface finish factor
   iii) Size factor
   iv) Notch sensitivity

b) A work cycle of a mechanical component subjected to completely reversed bending stresses consist of the following three elements: **[8]**
   i) $\pm$ 350 N/mm^2 for 85% of time
   ii) $\pm$ 400 N/mm^2 for 12% of time
   iii) $\pm$ 500 N/mm^2 for 3% of time

   The material for the component is 50C4 (S_{ut} = 660 N/mm^2) and the corrected endurance limit of the component is 280 N/mm^2. Determine the life of the component.

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Q2) a) Explain the following terms in connection with roller bearing, **[8]**

i) Static load capacity

ii) Dynamic load capacity

iii) Equivalent load capacity

iv) Load - life relationship

OR

a) Differentiate between static and dynamic capacity of the ball bearing. What is their significance in the selection of the bearings?

b) A deep-groove ball bearing having bore diameter of 60 mm and rotating at 1440 r.p.m. is subjected to radial force of 2500N and an axial force of 1200 N. The radial and thrust factors are 0.56 and 2.0 respectively. The load factor is 1.2. The expected rating life is 25,000 hrs. Calculate the required dynamic load capacity and select the bearing from manufacturer's catalogue given below in table no. 1. **[8]**

Table no.1

Principal Dimensions				Basic Capacity	
Bearing No.	Bore Dia 'd' mm	Outside Dia 'D'mm	Width 'B' mm	Static 'Co' kN	Dynamic 'C' kN
6012	60	95	18	23.20	29.60
6212	60	110	22	32.50	47.50
6312	60	130	31	52.00	81.90
6412	60	150	35	69.50	108.00

Q3) a) Explain the following terms in relation to sliding contact bearings, **[8]**

i) Length to diameter ratio

ii) Unit bearing pressure

iii) Radial Clearance

iv) Minimum film thickness

OR

a) With neat sketches, describe construction and working principles of hydrodynamic bearings.

b) The following data is given for a 360° hydrodynamic bearing. **[10]**

Radial load = 3.2kN

Journal speed = 1490 rpm

Journal diameter = 50 mm

Bearing length = 50 mm

Radial clearance =0.05 mm

Viscosity of lubricant = 25 cp

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing, calculate

i) Coefficient of friction

ii) Power lost in friction

iii) Minimum oil film thickness

iv) Flow requirement in litres/min

v) Temperature rise

Refer following data table:

l/d	ε	h_0/C	S	ϕ	(r/C)f	$Q/(rCn_sl)$
1	0.1	0.6	0.264	63.10	5.79	3.99
	0.6	0.4	0.121	50.58	3.22	4.33
	0.8	0.2	0.0446	36.24	1.70	4.62
	0.9	0.1	0.0188	26.45	1.05	4.74
	0.97	0.03	0.0047	15.47	0.514	4.82

SECTION - II

Q4) a) Explain different types of gear tooth failure. **[8]**

OR

a) Explain the force analysis in the design of spur gears.

b) It is required to design a pair of spur gears with 20° full-depth involute teeth consisting of a 20-teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW, 1450 rpm electric motor. The starting torque of the motor can be taken as 150% of the rated torque. The material of the pinion is plain carbon steel Fe410 (S_{ut} = 410 N/mm^2), while the gear is made of grey cast iron FG 200 (S_{ut} = 200 n/mm^2). The factor of safety is 1.5. Design the gears based on the Lewis equation and using velocity factor to account for the dynamic load. Lewis form factors for 20 and 50 teeth are 0.32 and 0.408 respectively. Assume pitch line velocity as 5 m/s. Recommended series of module: 7 or 9. **[8]**

Q5) a) Derive expression for wear strength of helical gears. **[8]**

OR

a) Explain with neat sketch the concept of virtual number of teeth and its significance in the design of helical gear.

b) A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and the normal pressure angle is 20°. The normal module is 3mm. Calculate **[10]**

i) The transverse module
ii) The transverse pressure angle
iii) The axial pitch
iv) The pitch circle diameters of the pinion and the gear
v) The centre distance and
vi) The addendum and dedendum circle diameter of the pinion

Q6) a) Explain with neat sketch the force analysis of bevel gear. **[8]**

OR

a) Explain the strength rating of worm gearing.

b) A pair of worm gears is designated as 1/30/10/8 Calculate **[8]**

i) The centre distance
ii) The speed reduction
iii) The dimensions of the worm and
iv) The dimensions of the worm wheel

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T.E. (Mechanical) (Part - III) (Semester - VI) (New) (Revised) Examination, November - 2017

INTERNAL COMBUSTION ENGINES

Sub. Code: 66841

Day and Date : Tuesday, 07 - 11 - 2017 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) **Attempt all the questions.**

2) **Make suitable assumptions if necessary and clearly mention them.**

3) **Figure to right indicate full marks.**

Q1) a) Define the following terms **[8]**

i) Clearance volume.

ii) Swept volume.

iii) Thermal efficiency.

iv) Air standard efficiency.

OR

b) Classify IC Engine and explain each type with examples. **[8]**

c) Explain with neat sketch port timing diagram for two stroke petrol engine. **[8]**

Q2) a) A four cylinder, four stroke square engine running at 40 rev/sec has a carburetor venturi with a 3 cm throat. Assuming the bore to be 10 cm, volumetric efficiency of 75%, the density of air to be 1.15 kg/m^3 and coefficient of air flow to be 0.75. Calculate, **[9]**

i) Engine volume sucked per second and mass flow rate.

ii) Suction pressure at throat.

b) Explain the following terms. **[9]**

i) Air fuel ratio and its types.

ii) Air fuel requirements for SI engine.

iii) Petrol injection in SI engine.

OR

c) Explain the injection nozzles used in CI engine and its types. **[9]**

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Q3) a) Write types of combustion chamber for SI engine and explain requirements of Combustion chamber. **[8]**

OR

b) Explain the factors influenced of engine variable on flame speed. **[8]**

c) Explain the effect of various engine variables on detonation. **[8]**

Q4) a) What modification is required, if the existing engine is to be supercharged? What are various methods of turbo charging? **[8]**

b) Explain with figure abnormal combustion in CI engine. Discuss for the control of knocking for CI engine. **[8]**

Q5) a) Discuss the various pollution norms and devices used for the control of engine emissions. **[8]**

b) What do you mean by induction swirl in combustion chamber of C I Engines? Discuss the advantages and disadvantages of the induction swirl. **[8]**

OR

b) What are the different methods to measure frictional power of ic engines. Explain Morse test. **[8]**

Q6) a) List the advanatges and disadvantages of supercharging of diesel engine. **[7]**

OR

a) Describe the sources for the production of Biodiesel and its advantages for utilization in IC engines. **[7]**

b) A four stroke petrol engine develops 50 kW and consumes 16 liters of petrol per hour of specific gravity 0.755. The calorific value of fuel used is 44500kJ/kg. Find its indicated thermal efficiency. If engine runs at 3000 rpm. It develops the mean effective pressure of 5.2 bar. Determine the bore and length of stroke if stroke length is 1.1X bore. **[7]**

c) Write notes on HC Emission and their control. **[4]**

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Seat No.	

Total No. of Pages : 3

S.E. (Mechanical) (Part - II) (Semester - IV) (Revised) Examination, November - 2017

MACHINE TOOLS & PROCESSES

Sub. Code : 63364

Day and Date : Tuesday, 07 - 11 - 2017

Time : 10.00 a.m. to 01.00 p.m. **Total Marks : 100**

Instructions : 1) All Questions are compulsory.

2) Figures to the right indicate full marks

3) Assume suitable data, if necessary.

4) Use of Non-programmable Scientific Calculator is allowed.

Q1) Attempt any four (4 marks each) :

a) Explain the properties of molding sand . Suggest the methods to measure the same. [4]

b) State the function of riser in the gating system. [4]

c) What are the steps involved in gravity die casting. [4]

d) Draw neat sketch of cupola furnace and name the parts. [4]

e) List the defects related to molding process? Explain any two of them. [4]

Q2) Attempt any four (4 marks each) .

a) Briefly explain principle of rolling with neat sketch. [4]

b) Distinguish between open and closed die forging processes. [4]

c) Show by schematic sketches the process of forward extrusion. Give two examples of components produced by extrusion. [4]

d) Why is lubrication difficult in wire drawing process? State the methods generally employed in it. [4]

e) Indicate by means of flow diagram the different stages in manufacture of 50 mm diameter rod from a steel ingot. [4]

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Q3) Write a short note on (Any Three) :

a) Advantages and Limitations of sand casting process [6]

b) Defects in forging [6]

c) Injection molding [6]

d) Thermoforming process for plastic [6]

Q4) Attempt any four (4 marks each)

a) A lathe is provided with a change gear set from 20 to 125 teeth in steps of 5 teeth and an additional gear of 127 teeth. Find the gear train for cutting metric thread of 3 mm pitch on a lathe having lead screw pitch as 6 TPI. [4]

b) How are a capstan and turret lathe headstock classified? Describe any one of them. [4]

c) Describe in brief working principle of boring machine. [4]

d) Draw neat sketch of following operations performed on drilling machine. [4]

i) Countersinking

ii) Counterboring

e) Give the specification of lathe. [4]

Q5) Attempt any four (4 marks each) :

a) Explain the method of carrying out an operation on shaper. [4]

b) Outline the procedure of planning vertical surfaces. [4]

c) Make a neat sketch of Universal milling machine. State its advantages. [4]

d) What are various tool holding devices used on milling machine? [4]

e) Compare the gear shaving with gear rolling. [4]

Q6) Write a short note on (Any Three) :

a) Abrasive Jet Machining advantages & limitations [6]

b) Application of Electro- Chemical machining with neat sketch [6]

c) Water jet machining process [6]

d) Various operations performed on milling machine [6]

SF-86

Total No. of Pages : 3

Seat No.	

S.E. (Mechanical) (Part - II) (Semester-IV) (Revised) Examination, November - 2017

THEORY OF MACHINES - I

Sub. Code : 63363

Day and Date : Monday, 06-11-2017 **Total Marks : 100**

Time : 9.30 a.m. to 1.30 p.m.

Instructions :
1) **Attempt all questions.**
2) **Figures to the right indicates full marks.**
3) **Draw neat labeled sketch wherever necessary.**
4) **Assume suitable data, if necessary and state clearly.**
5) **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) a) Write a note on Grubler's criterion for planar mechanism. **[8]**

OR

a) Explain the inversions of single-slider crank chain with neat sketches. **[8]**

b) A reciprocating engine mechanism is shown in fig.1.b. Crank OC is 60 mm long and connecting rod CP is having length of 180mm. By using Klein's construction method, find the velocity and acceleration of the piston if the crank is rotating at 180 r.p.m. **[8]**

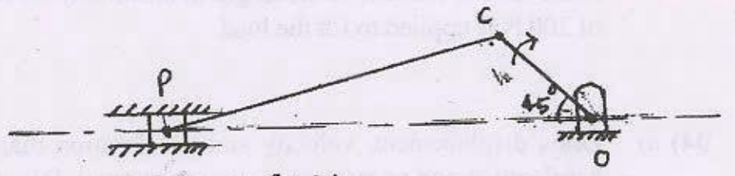


fig.1.b

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P.T.O.

Q2) Crank OA of the quick return mechanism shown in fig. 2. revolves at a uniform speed of 250 r.p.m. in clockwise direction. The dimensions of various links are: OA = 75 mm, PQ = 375 mm, and QR = 400 mm. Crank makes 45° with vertical line PO. Find: i) velocity of R, ii) acceleration of R and iii) angular acceleration of QR. **[18]**

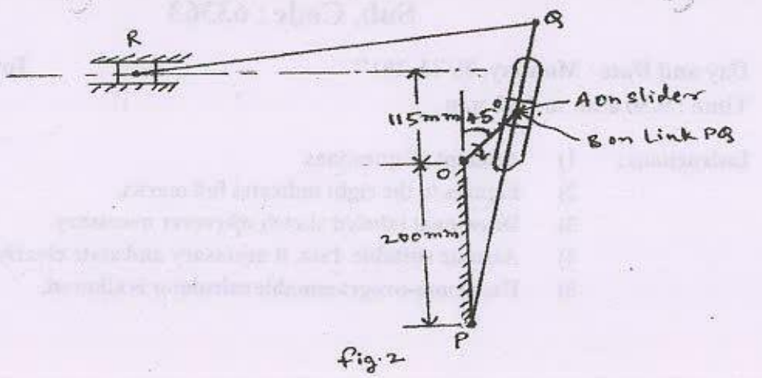


fig. 2

Q3) a) Derive the equation for friction torque in case of conical pivot bearing assuming uniform pressure with usual notations. **[8]**

OR

a) Derive the equation for friction torque in case of flat pivot bearing assuming uniform pressure condition. **[8]**

b) A screw jack has square threaded screw with mean diameter of 40 mm. The pitch of the thread is 6 mm and the coefficient of friction at the screw is 0.16. The load to be lifted is 25 kN and is supported by a collar having mean diameter of 50 mm and the coefficient of friction at the collar is 0.18. Determine the length of the tommy bar required if an effort of 200 N is applied to lift the load. **[8]**

Q4) a) Draw displacement, velocity and acceleration diagram for Uniform acceleration and retardation motion program of follower. **[4]**

b) A cam is operating an oscillating roller follower having SHM during outward and return stroke. Draw the cam profile for the following given data;

Distance of roller centre from cam centre at the start of ascent = 60 mm;

Follower arm length = 80 mm; Distance of pivot point from cam centre = 100 mm;

Angle of ascent = 60°; Angle of descent = 90°; Angle of dwell in between = 45°

Angle of oscillation of follower arm during ascent and descent = 15° **[14]**

Q5) a) Derive the equation of ratios of belt tensions in case of flat belt drive. **[6]**

OR

a) Explain slip and creep in belt. **[6]**

b) An open belt running over two pulleys 240 mm and 600 mm diameter connects two parallel shafts 3m apart and transmits 4 kW from smaller pulley that rotates at 300 rpm. Coefficient of friction between the belt and pulley is 0.3 and safe working tension is 10 N per mm width. Determine minimum width of belt, initial tension in belt. **[10]**

Q6) a) Explain controlling force and controlling curve. **[6]**

OR

a) Explain the terms height of governor, Isochronism and stability related to governor. **[6]**

b) In a porter governor, each of the four arms is 400 mm long. The upper arms are pivoted on the axis of rotation whereas the lower arms are attached to the sleeve at a distance of 45 mm from the axis of rotation. Each ball has a mass of 8 kg and the load on the sleeve is 60 kg. What will be the equilibrium speeds for the two extreme radii of 250 mm and 300 mm of rotation of governor balls? **[10]**

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SECTION - II

Q4) Attempt any two **[2 × 8 = 16]**

a) Compare FDMA & TDMA.

b) Explain any two spread spectrum multiple access.

c) Discuss signalling system 7.

Q5) Attempt any two **[2 × 8 = 16]**

a) Explain Global System for mobile

b) Explain IEEE - 802.11 standards.

c) Explain DECT functional concept.

Q6) Write a note on any three **[3 × 6 = 18]**

a) Personal Communication Services.

b) ISDN

c) X.25 Protocol

d) Network access protocol.

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SUK-BCE