Seat
No.

S.E. (Civil) (Part-II) (Semester - IV) (Revised) Examination, May - 2018
BUILDING DESIGN AND DRAWING
Sub. Code : 63348

Day and Date : Wednesday, 16 - 05 - 2018   **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 your own data wherever necessary and mention it.

SECTION-I

Q1) a)   What do you understand by orientation of a building? State the factors affecting orientation of a building.   **[5]**

b)   Illustrate significance of open spaces around a building?   **[5]**

OR

b)   Explain building line byelaws.   **[5]**

Q2)   A residential building (G + 1) is to be planned for a professional architect for the data given below.   **[20]**

a)   Size of the plot : 18 m × 24 m.

b)   A 6 m wide Road is on southern side and is parallel to 18 m side of the plot.

c)   Following accommodation is to be provided:

- Visitors waiting - 1 No.
- Office Room - 1 No.
- Master Bed Room - 1 No.
- Living cum dining - 1 No.
- Kitchen with store - 1 No.
- Children's Bed - 1 No.
- Store.
- Separate bath and WC.
- Staircase and portico are to be provided

P.T.O.

Design the building plan assuming suitable dimensions and draw to a suitable scale the following views: [5]

- Floor plans
- Furniture layout of office room

Q3) a) Explain the concept of Green Building. [6]

b) Explain the purpose of maintenance of buildings. An existing door of a house is beginning to scrap the floor surface. What is the cause of this fault and what will you do to remove this fault. [9]

OR

b) Explain maintenance, repairs and rehabilitation of structures. [9]

SECTION-II

Q4) a) What are the functions of traps? Describe P, Q and S traps with sketches. [6]

b) Explain the systems of plumbing with neat sketches. [10]

Q5) a) State the objects of plastering. What are the requirements of good plaster? [6]

b) Why ventilation is necessary in buildings? Explain the methods of ventilation. [10]

Q6) Write notes on any three: [18]

a) Characteristics of good paint.

b) Intercepting Trap.

c) Types of Wiring.

d) Types of Pointing.

e) Rain Water Harvesting.

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S.E. (Civil) (Part-II) (Semester - III) (Revised)
Examination, April - 2018
BUILDING CONSTRUCTIONS AND MATERIALS
Sub. Code : 63342

Day and Date : Saturday, 28 - 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) Assume suitable data if necessary.

SECTION-I

Q1) a) Explain Characteristics of good building stones depending on that where these stone can be use in Building Construction. **[8]**

b) Draw Cross section through external framed structure wall showing all components in super structure mentioning their functional consideration. **[8]**

Q2) a) Draw a neat sketch of an one and one and half brick thick English Bond masonry. **[10]**

     i) Plan of Odd and Even Course

     ii) Elevation for at least six courses.

b) Differentiate between English Bond and Flemish bond. **[6]**

Q3) Write Short Notes on any three: **[18]**

     a) Windows fixtures and fastening.

     b) Ramp.

     c) Construction of stepped column footing.

     d) Ideal Requirements of good formwork.

     e) Partition walls.

P.T.O.

SECTION-II

Q4) Design and draw dog legged staircase for a residential building to a scale of 1 : 20 the plan and sectional elevation for following Data. **[25]**

a) Storey height : 2.9 m

b) Staircase internal room size 4 × 2.2 m

c) Show step and railing details.

Q5) Draw to a suitable scale the sectional plan side view, and elevation of a aluminum glazed window for clear opening - 1200 mm × 1150 mm. Assume required data wherever necessary. (Also mention appropriate dimension for different parts of the window). **[25]**

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S.E. (Civil) (Semester-IV) (Revised) Examination, May - 2018
STRUCTURAL MECHANICS
Sub. Code: 63344

Day and Date : Friday, 04 - 05 - 2018

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

Total Marks : 100

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) i) Define Principal plane and Principal stress. [2]

ii) Give the relationship between principal stresses and maximum shear stress. [3]

b) A steel plate marked with circle of diameter 100 mm is acted upon by $\sigma_x = 100$ MPa(T) $\sigma_y = 20$MPa (C) and shear stress 30 MPa on all the faces. Find the major and minor axes of the ellipse after deformation and their orientation. E=2.1×10^5 MPa and $\mu = 0.25$. [11]

Q2) a) Explain the checks for safety of the gravity dam. [6]

OR

Derive the critical value of eccentricity on a circular cross section and show the Kern of the section.

b) A square chimney has outer and inner dimension as 2m and 1m respectively. The height of chimney is 14m. Find the max. and min. Intensities of pressure at the base when it is subjected to wind pressure 1.4 kN/Sqm. acting along one of the diagonals. Take unit weight as chimney as 22kN/Cum. Coef. of wind pressure = 0.5. [10]

P.T.O.
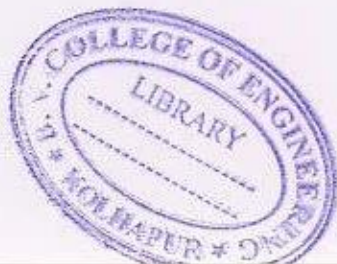
)3) Solve any TWO : [2×9=18]

a) Construct the influence line diagrams for the force in members U_1U_2, U_2L_1 and L_1L_2 for the deck truss shown in fig.1
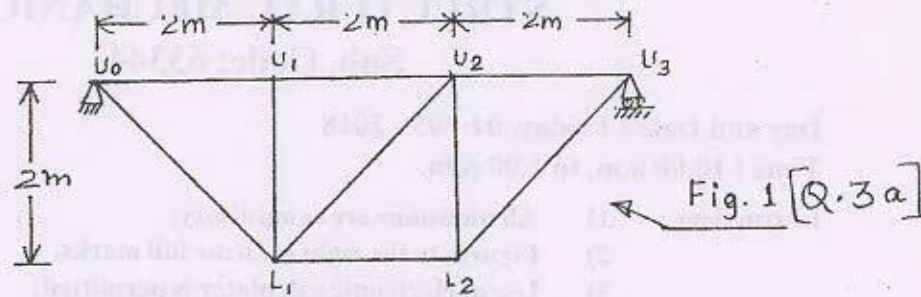

Fig. 1 [Q.3 a]

b) Construct the influence line diagrams for the reactions at the supports at A, C and F for the compound beam shown in fig.2.
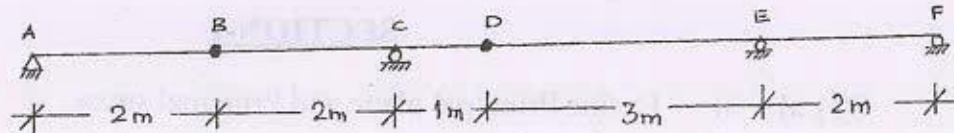

Fig. 2 [Q.3 b]

c) Using the I.L.D. s of Q.3 (b) find the values of these reactions when load of 100 kN acts on the hinge B.

SECTION-II

)4) a) State the salient features of Macaulay's method. [6]

OR

State the theorems of moment area method with the neat sketch. [6]

b) A horizontal beam AB is simply supported at A and B 8m. apart. It carries u.d.l. of 15kN/m and clockwise couple of 160 kN.m at C, 3m from A. Calculate slope and deflection at C Take $EI=4\times10^4 kN.m^2$. [10]

)5) a) Explain the terms equivalent moment and equivalent torque. [5]

b) A flywheel weighing 6 kN is mounted on ashaft of 80mm dia. Midway between the bearings 600mm apart. If the shaft transmits 30kW at 360 r.p.m. calculate principal stresses and maximum shear stress. [11]

)6) a) With conventional notations derive the Rankine's formula. [6]

b) A built up column section consists of RSJ 150×100 and steel plate 120×12mm placed on each flanges. Calculate the load carrying capacity if it is 4m long with both ends fixed. Take factor of safety=3, Properties of RSJ: Area = 21.67 sq.cm. I_{xx} = 839.1cm^4, I_{yy}=94.8cm^4, f_y=315 MPa, constant α=1/7500. [12]

OR

Compare the buckling loads given by Euler and Rankine formulae for a tubular steel strut 2.5m long with inner and outer diameter 3cm and 4cm respectively having both ends pinned. Take f_y=330 MPa, E=200 GPa Rankine's constant=1/1600. [12]

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No.

S.E. (Civil) (Part - II) (Semester - IV) Examination, May - 2018
FLUID MECHANICS - II
Sub. Code: 63347

Day and Date : Monday, 14 - 05 - 2018   **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) A trapezoidal channel has one vertical side wall and the other 45° sloping wall. If it is to deliver water at 25 m³/sec with a velocity of 0.8 m/sec. Compute bed width and flow depth for minimum lining area.   **[5]**

b) State the factors affecting Manning's 'n' and explain their effect on Manning's n.   **[5]**

c) Show that the relation between the alternate depths Y_1 and Y_2 in a rectangular channel can be expressed as   **[5]**

$$\frac{2Y_1^2 Y_2^2}{(Y_1 + Y_2)} = Yc^3$$

Where Yc is critical depth.

d) Write the basic assumptions of gradually varied flow.   **[5]**

Q2) a) A rectangular channel 20m wide flows with normal depth of 2m with a bed slope of 1/6400. At a certain section the depth of flow is 3m. How far up stream or down stream of this section will be the depth 2.6m. Use single step method. Take n=0.015. Sketch and classify the profile. **[5]**

b) Classify the channel bed slopes and show various zones.   **[5]**

c) Write short note on M_2 and S_2 profile.   **[5]**

P.T.O.

SV - 16

Q3) a) Write a detail note on specific energy curve with help of diagram. [5]

b) What is critical depth? With usual notations prove that in case of rectangular channel [5]

$$Yc^3 = \frac{q^2}{g}$$

c) A wide rectangular channel carries a discharge of 10m³/sec per meter width with a bed slope of 1 in 1500. Find the normal depth. Take n = 0.015. [5]

Q4) a) In a horizontal rectangular channel 1.5m wide, if the observed depths before and after the jump are 0.2m and 1.0 m respectively. Determine the discharge flowing through the channel also find the energy loss due to jump in KW. [5]

b) Show that the head loss in a hydraulic jump formed in a rectangular channel may be expressed as [5]

$$\Delta E = \frac{(V_1 - V_2)^3}{2g(V_1 + V_2)}$$

c) Give the classification of hydraulic jump and their Froude number. [5]

SECTION-II

Q5) a) Sketch a layout of a typical hydro electric plant and explain in brief function of each element. [5]

b) Draw the figure of centrifugal pump and explain its working. [5]

c) Write a short note on priming of a centrifugal pump. [5]

d) Derive an expression for force exerted by jet on a flat fixed plate held inclined to the jet. [5]

-2-

SV - 16

Q6) a) What is weir? How are the weirs classified? [5]

b) A sharped - edged rectangular notch 50 cm broad has been used to measure the discharge estimated to be about 20 litres per second. Find the percentage error in computing the discharge that would be introduced by an error of 2 mm in observing the head over the notch. Take discharge Cd = 0.63 for the notch. [5]

c) What is the difference between sharp crested weir and broad crested weir? [5]

Q7) a) Derive an expression for force exerted by jet on a series of flat plate striking at its centre. Also determine the maximum efficiency developed? [5]

b) A 75 mm diameter jet having a velocity of 30m/sec strikes a flat plate the normal of which is inclined at 45° to the axis of the jet. Find the normal force on the plate. [5]

i) When the plate is stationary.

ii) When the plate moving with a velocity of 15m/sec and away from jet.

Also determine the power and efficiency.

c) A jet of water 2cm in diameter having velocity of 30m/sec impinges on a curved vane and is deflected through an angle of 150°. Find [5]

i) The force exerted by the jet on the vane in the direction of motion when the vane is fixed.

ii) The work done if the vane is moving with a velocity of 10m/sec.

Q8) a) Give the comparison between impulse and reaction turbine. [5]

b) Draw a sketch of pelton wheel turbine and explain the purpose of each part. [5]

c) Write short note on NPSH-centrifugal pump. [5]

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No.

S.E. (Civil Engineering) (Semester - IV)
Examination, May - 2018
CONCRETE TECHNOLOGY
Sub. Code: 63346

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 indicate full marks.
                  3)   Assume suitable data if necessary.

SECTION - I

Q1) a) Explain the phenomenon of hydration of cement and its effect on strength of cement.   [8]

b) Explain impact and abrasion test on coarse aggregate.   [8]

Q2) a) Explain in brief methods of transportation and placing of concrete used for making concrete?   [8]

b) Define workability. Enlist the test for measurement of workability. Explain compaction factor test.   [8]

OR

b) Explain the effects of different chemical admixture on fresh concrete.[8]

Q3) a) Explain the relation between the strength and water-cement ratio of concrete.   [9]

b) Explain how to determine static modulus of elasticity of harden concrete.   [9]

SECTION - II

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

a)   High performance concrete.
b)   Cold weather concerting.
c)   No fines concrete.
d)   Light weight concrete.

P.T.O.

5) a) Explain effect of w/c ratio on durability and permeability of concrete.**[8]**

   b) What are the various types of chemical attacks encountered by concrete?
   [8]

OR

   b) Explain the techniques of measuring and factors affecting measurement of Ultrasonic Pulse Velocity.
   [8]

6) Design M 20 grade of concrete using the following data as per ACI 211-91 method:
   [16]

   Grade of cement : 43 Grade OPC

   Degree of quality control : Good

   Maximum size of aggregate : 20 mm

   Slump required : 100 mm

   Fineness modulus of fine aggregate : 2.9

   Specific gravity of Coarse aggregate : 2.98; Fine aggregate : 2.78

   Density of coarse aggregate : 1600 kg/m³

   Density of fine aggregate : 1500 kg/m³

   Sand : Zone I

   Assume any other data suitably.

Table 11.4. Dry Bulk Volume of Coarse Aggregate per Unit Volume of Concrete as given by ACI 211.1—91

Maximum Size of Aggregate	Bulk volume of dry rodded coarse aggregate per unit volume of concrete for fineness modulus of sand of			
FM	2.40	2.60	2.80	3.00
10	0.50	0.48	0.46	0.44
12.5	0.59	0.57	0.55	0.53
20	0.66	0.64	0.62	0.60
25	0.71	0.69	0.67	0.65
40	0.75	0.73	0.71	0.69
50	0.78	0.76	0.74	0.72
70	0.82	0.80	0.78	0.76
150	0.87	0.85	0.83	0.81

Table 11.5. Relation between water/cement ratio and average compressive strength of concrete, according to ACI 211.1-91

Average compressive strength at 28 days MPa	Effective water/cement ratio (by mass)	
	Non-air entrained concrete	Air-entrained concrete
45	0.38	-
40	0.43	-
35	0.48	0.40
30	0.55	0.46
25	0.62	0.53
20	0.70	0.61
15	0.80	0.71

Table 11.8. Approximate requirements for mixing water and air content for different workabilities and nominal maximum size of Aggregates according to ACI 211.1-91

Workability or Air content	Water Content, Kg/m³ of concrete for indicated maximum aggregate size							
	10 mm	12.5 mm	20mm	25 mm	40 mm	50 mm	70 mm	150 mm
	Non-air-entrained concrete							
Slump								
30-50 mm	205	200	185	180	160	155	145	125
80-100 mm	225	215	200	195	175	170	160	140
150-180 mm	240	230	210	205	185	180	170	-
Approximate entrapped air content per cent	3	2.5	2	1.5	1	0.5	0.3	0.2
	Air-entrained Concrete							
Slump								
30-50 mm	180	175	165	160	145	140	135	120
80-100 mm	200	190	180	175	160	155	150	135
150-180 mm	215	205	190	185	170	165	160	-
Recommended average total air content percent								
Mild exposure	4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0
Moderate exposure	6.0	5.5	5.0	4.5	4.5	4.0	3.5	3.0
Extreme exposure	7.5	7.0	6.0	6.0	5.5	5.0	4.5	4.0

Table 11.6. Requirements of ACI 318-89 for W/C ratio and Strength for Special Exposure Conditions

Exposure Condition	Maximum W/C ratio, normal density aggregate concrete	Minimum design strength, low density aggregate concrete MPa
I. Concrete intended to be Watertight		
(a) Exposed to fresh water	0.5	25
(b) exposed to brackish or sea water	0.45	30
II. Concrete exposed to freezing and thawing in a moist condition		
(a) kerbs, gutters, gaurd rails or thin sections	0.45	30
(b) other elements	0.50	25
(c) in presence of de-icing chemicals	0.45	30
III. For corrosion protection of reinforced concrete exposed to de-icing salts, brackish water, sea water or spray from these sources	0.40	33

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No.

S.E. (Civil) (Semester - IV) (Revised) Examination, May - 2018
SURVEYING - II
Sub. Code: 63345

Day and Date : Monday, 07 - 05 - 2018   **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

1) a) Calculate area of triangle OAB. When the observation are made on a staff is held vertical. The telescope is fitted with anallatic lens. **[10]**

Inst. st	Height of Inst.	Staff Station	WCB	Vertical angle	Top	Center	Bottom
O	1.530	A	14°48'	-15°20'	2.450	1.980	1.510
		B	64°54'	0°0'	2.620	2.120	1.620

b) Describe difference between theodolite & Tacheometer. Enlist various method of tacheometry. **[7]**

2) a) What are the factor to be kept in mind while selection of triangulation station? **[5]**

b) The elevation of two station A & B 100 Km apart are respectively 84 m and 108 M above mean sea level. Calculate the approximate height of the scaffold at A if the height of signal above station B 19 m assuming intervening ground at mean sea level. **[7]**

c) What is phase of signal? Explain in detail. **[5]**

P.T.O.

Q3) a) Write a detailed note on the principle and use of Tellurometer. [5]

b) Explain the use of field astronomy in civil engineering. [5]

c) Explain following terms: [6]
i) Zenith Distance
ii) Latitude
iii) Declination

Q4) Write Short notes on (Any Four): [16]
a) Reduction of stadia notes.
b) Eccentricity of signals.
c) Astronomical Triangle.
d) Jeff cott direct reading tacheometer.
e) Tangential method of tacheometry.

SECTION-II

Q5) a) What are the different methods of setting out a simple circular horizontal curve? Explain the field procedure of any one them. [8]

b) Two straights AB and BC are intersected by a line DE. The angles AD̂E and DÊC are 145° and 140° respectively. The radius of the first curve is 400 m and that of the second curve is 600 m.

Find the chainages of the tangent points and point of compound curvature given that the chainage of intersection point is 4415 m. [9]

Q6) a) What is the necessity of providing overlaps in Aerial photogrammetry? What are the different types and what are their usual percentage values.[9]

b) The photographic co-ordinates of two points A and B of respective elevation 250 m and 350 m on vertical photograph are x_a = + 100 mm, y_a = + 80 mm, x_b = − 80 mm y_b = −100 mm. Taking the flying height of camera as 2500 m and focal length of camera lens as 200 mm, find the distance AB. [8]

Q7) a) Write in detail applications of Remote sensing in Civil Engineering. [8]

b) What is GPS? Explain its applications in Civil Engineering. [8]

Q8) Write short notes on : [16]
a) Mosaics.
b) Components of GIS.
c) Terrestrial Photogrammetry.
d) Composite curves.

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Seat
No.

S.E. (Civil) (Semester - III)
Examination, April - 2018
SURVEYING - I
Sub. Code : 63339

Day and Date : Wednesday, 25- 4 - 2018   Total Marks : 100
Time : 2.30 p.m. to 5.30 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)   Answer shall be supported by adequate sketches.

SECTION - I

Q1) a) Describe the temporary adjustments of the dumpy level and explain clearly
           the necessity of permanent adjustments and necessary fundamental
           relations.   [6]

   b)   What does the term "sensitiveness"mean in the context of a bubble?
           Derive the expression for "sensitiveness" of bubble.   [6]

   c)   A dumpy level was set up and leveled with its eyepiece over a peg C.
           The height from the top of C at the centre of the eyepiece was measured
           and found to be 1.246m. The staff reading on peg D was O.892m. The
           instrument was then moved and set up at D. The height of the eyepiece
           above D was 1.362m. The reading on the staff held on the peg C was
           1.720m. Determine the true reduced level of the peg D if that of peg C
           was 150.000m.   [5]

Q2) a) A dumpy level was set up at the centre two pegs A and B 80m apart and
           its staff readings taken on pegs A and B were 1.460m and 1.215m
           respectively. The instrument was then shifted to a point 8 m away from
           peg A in line BA produced. The observed staff readings on pegs A and
           B were 1.325 and 1.210m respectively. Is the line of collimation in
           adjustment if not/is it inclined upwards or downwards. What should be
           the staff readings on pegs A and B from the second position of the
           instrument to give a horizontal line of sight?   [10]

P.T.O.
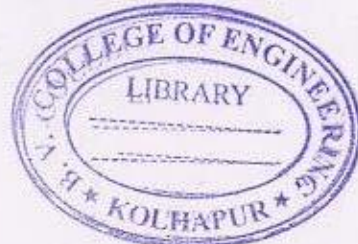
b) Write short notes on the following: [6]

    i)   Principal of-Equating Back sight and fore sight.

    ii)   Auto Level

23) a) What is the principle of plane table of survey? State the advantage and disadvantage of plane table survey over other types of survey. [6]

   b) Explain tracing paper method of solving three point problems with a neat diagram. [6]

   c) Distinguish between plane and telescopic alidade. [4]

24) a) Describe the methods of interpolation of contours. [6]

   b) Define area of zero circle and methods for determination of area of zero circle. [6]

   c) Write in brief on characteristics of contour. [6]

SECTION - II

25) a) What do you understand by the terms [6]

    i)   Transiting

    ii)   Swinging

    iii) Telescope normal

   b) State different permanent adjustments of a transit theodolite. Explain any one of them. [7]

   c) Describe the stepwise procedure of measuring magnetic bearing of a line using a transit theodolite. [4]

26) a) Define consecutive co-ordinates. What is the advantage of plotting the traverse using total co-ordinates? How the total co-ordinates for the first station is selected ? [6]

   b) Differentiate between Bowditch rule and Transit rule for the adjustment of a traverse. [3]

   c) Following is the particulars of a closed traverse run in clockwise direction. Calculate the length and bearing of the line DA and also the angle CDA.[8]

Line	AB	BC	CD
Length in m.	145.80	517.20	315.90
Bearings	342° 24'	14° 35'	137° 20'

27) a) What is sounding in hydrographic surveying ? Describe different methods of sounding. [6]

   b) Explain the construction and use of Ceylon Ghat Tracer. [5]

   c) Explain the procedure for carrying out preliminary survey for a new road alignment. [6]

28) a) Instrument stations P, R and the signal point Q are in the same vertical plane. Distance PR is 100 m. Angle of elevation of Q from P is 28° 42' and that from R is 18° 6'. Staff readings on a bench mark of R.L. 287.280 m from P is 2.870 m and that from R is 3.750 m. Calculate the reduced level of signal point Q. [8]

   b) What do you understand by omitted measurements? Discuss briefly the different cases. [8]

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Seat
No.

S.E. (Civil) (Semester - III) Examination, April - 2018
FLUID MECHANICS - I (Revised)
Sub. Code : 63341

Day and Date : Friday, 27 - 04 - 2018   Total Marks : 100

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

Instructions :   1)   Attempt any THREE questions from EACH section.

2)   Assume any suitable data if necessary, wherever needed.

3)   Figures to the right indicate full marks.

SECTION - I

Q1) a)   What is the difference between dynamic viscosity and kinematic viscosity? Why does viscosity of gas increase with increase in temperature while that of a liquid decreases with increase in temperature.

b)   Define surface tension. Prove that the relationship between surface tension, σ and pressure inside the droplet of liquid in excess of outside pressure is given by $p = 4 \sigma/d$

c)   Explain the concept of cavitation.

d)   A liquid of viscosity 20 poise flows over a plate, the velocity at any level varying parabolically with the distance from the plate. The vertex of the parabolic velocity distribution diagram is 0.5 m from the plate. The velocity varies from zero at the plate to 2.5m/sec at 0.5 m from the plate. Find the velocity gradient at the plate. Find the velocity gradient at the plate band at 0.5 m from the plate.

[4×4]

Q2) a)   What do you mean by hydrostatic pressure? Derive Hydrostatic Law showing pressure at any point below free liquid surface is given by $p = \gamma h$.

b)   The torque T, delivered by a water turbine depends upon discharge Q, head H, specific weight γ, angular velocity ω and efficiency η. Find functional relationship.

[2×8]

P.T.O.

3) a) A wooden cylinder of diameter 'd' length '2d' floats in water with its axis vertical. It is in stable equilibrium. Locate the metacentre with reference to water surface. Specific gravity of wood is 0.6. **[4]**

b) The following are the velocity components in 2-D flow. Show that they represent a possible case of irrotational flow. **[4]**

$u = y^3/3 + 2x - x^2y$ and $v = xy^2 - 2y - x^3/3$

c) For a flow field, the stream function is given by : $\psi = 3x^3y + 8xy - 3xy^3$. Determine the potential function ϕ **[8]**

4) Attempt any three **[3×6]**

a) Newton's Law of Viscosity and differentiate between Newtonian a $\bigcirc$ Non Newtonian fluids

b) Describe in brief and the inferences of Reynold's Experiment

c) Explain the procedure of determination of metacentric height in the laboratory

d) Explain: Classification of flow

SECTION - II

25) a) State Bernoulli's theorem. Apply the theorem to venturimeter to derive the Discharge equation . Draw sketch of venturimeter. **[8]**

b) What are different Hydraulic coefficients of orifice. State $\bigcirc$ir expressions.

Draw sketch. An orifice having 10 cm. diameter discharges water under a constant head of 4.6 m. The diameter of jet at vena-contracta is found to be 8.81cm. If the actual discharge through orifice is 45 lit/s, determine the hydraulic coefficients. **[8]**

26) a) A pipe 60 mm. diameter and 450 m. long slopes upwards at 1 in 50. An oil of viscosity 0.9 Ns/m² and specific gravity 0.9 is required to be pumped at the rate of 5 LPS.

i) Is the flow laminar?

ii) What is the power of the pump required assuming an overall an efficiency of 65%.

iii) What is the velocity at the center & velocity gradient at pipe wall?

[8]

b) Find the displacement thickness, momentum thickness and energy thickness for the velocity distribution in the boundary layer given by

$u/V = 2(y/\delta) - (y/\delta)^2$ **[8]**

27) a) What are different losses in pipes?

Derive Darcy - Weisbach equation for Frication loss through pipe. Comment on frication factor. **[8]**

b) Two tanks are connected by three pipes in series. The length of pipes are 300 m, 150m & 200m and their respective diameter are 30cm, 15cm, 30cm. The water level deference between two reservoir is 15 m. Find the discharge through the pipeline if coefficient of friction for three pipes are 0.07, 0.025 & 0.03 respectively. **[8]**

Q8) Write short notes on any three. **[18]**

a) Pitot tube & orifice meter.

b) Reynolds experiment &its results.

c) Water hammer & surge tank.

d) Moody's chart.

e) Separation of boundary layer.

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Seat
No.

SE (Civil) (Part - II) (Semester - III) Examination, April - 2018
STRENGTH OF MATERIALS - I (Revised)
Sub. Code : 63340

Day and Date : Thursday, 26 - 04 - 2018   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)   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, Hooke's law and Modulus of Elasticity E and hence obtain expression for axial deformation δ of a homogeneous elastic rod of length L and area A subjected to axial force P.   **[4]**

b)   Determine the deformation of the steel rod as shown in Fig. 1 under the action of given axial loads. Consider E = 200 GPa. Areas are 600 mm² and 200 mm² for 0.6 m length segment and 0.4 m length segment respectively.   **[13]**
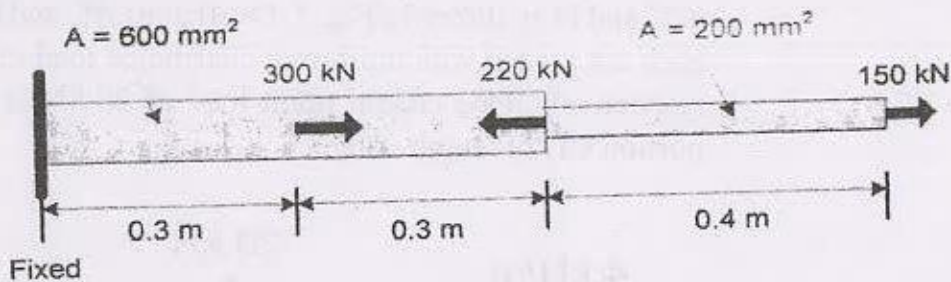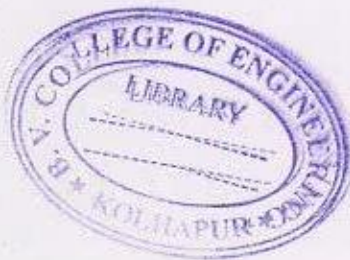

Fig. 1

OR

a) Explain Bulk Modulus (k) and derive relationship between k, E (Modulus of Elasticity) and v(Poisson's ratio). **[4]**

b) At room temperature (20° C) a 0.5 mm gap exists between the wall and Bronze bar of length 0.35 m. Aluminum bar of length 0.45 m is attached to Bronze bar as shown in Fig. 2. Determine the temperature at which the normal stress in the Aluminum bar will be equal to – 90 MPa and corresponding length of the Aluminum bar. **[13]**

Aluminum: $A_A = 1800$ mm^2, $E_A = 73$ GPa, $\alpha_A = 23.2 \times 10^{-6}/{}^0$C.

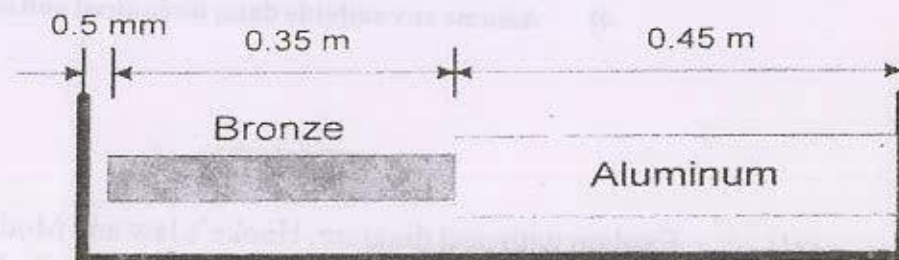Bronze: $A_B = 1500$ mm^2, $E_B = 105$ GPa, $\alpha_B = 21.6 \times 10^{-6}/{}^0$C

Fig. 2

22) a) Explain point of contra flexure and its relationship with corresponding Shear Force Diagram. **[4]**

b) Draw Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) for a beam ACDB of length 4 m, free at A, free at B and simply supported at C and D as shown in Fig. 3. Overhangs AC and DB are of 1 m length each are loaded with uniformly distributed load of 4 kN/m and 8 kN/m respectively. One central point load of 20 kN is applied at center of portion CD of length 2 m. **[13]**
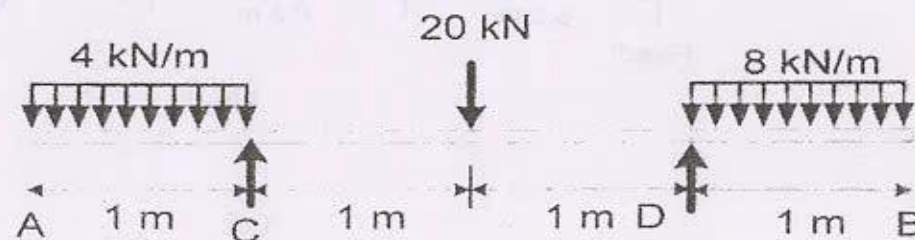

Fig. 3

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23) a) Explain using Mohr's circle, expressions for circumferential stress and longitudinal stress in thin walled cylinders. **[4]**

b) Two rods, Steel (AB) and Brass (BC) connected together as shown in Fig. 4. If allowable stresses in Steel and Brass rods are 104 MPa and 55 MPa respectively. Find the required diameters of Brass (BC) and Steel (AB) rods if largest torque T applied at A is 1130 N.m. **[12]**
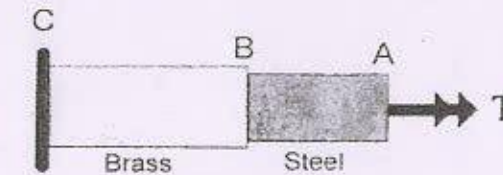
SECTION -II

24) a) A steel pipe of 100 mm outer diameter is to be used as cantilever beam of length 2.4 m subjected to 5 kN point load at free end. The allowable bending stress in steel used is 165 MPa. determine the minimum thickness of steel pipe to support the load. **[9]**

b) Design the depth of a rectangular timber beam section of width 150 mm. The beam is simply supported on span 4 m subjected to uniformly distributed load of 8 kN/m on entire span. Consider allowable stress in timber is 12 MPa. **[8]**

25) a) Draw general shear stress distribution across the section of unsymmetrical I section and Box section. **[4]**

b) A symmetrical I section steel beam having flanges of 150 mm × 20 mm and web 10 mm × 200 mm (All dimensions are Hz × Vt). If the beam is simply supported over a span of 4 m subjected to uniformly distributed load of 40 kN/m over entire span. Draw shear stress distribution across the depth of the section at support. **[13]**

26) A cantilever rectangular beam of length L of section b × d subjected to point load P at free end. Neglecting effect of shear stress, obtain deflection δ at free end in terms of P, L, E (Modulus of Elasticity) and I (Moment of Inertia) using strain energy method. **[16]**

Seat No.	

S.E. (Civil Engg.) (Semester - III)
Examination, April - 2018
ENGINEERING MATHEMATICS - III
Sub. Code :63338

Day and Date : Tuesday, 24- 4 - 2018
Time : 2.30 p.m. to 5.30 p.m.

Total Marks : 100

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) $(D^2 + 9)y = e^x - \cos 3x$

b) $(D^2 + 3D + 2)y = \sin e^x$

c) $(D^3 - 3D^2 + 3D - 1)y = xe^x$

d) The deflection of a strut with one end built in and the other supported and subjected to end - thrust P satisfies the equation $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R}{P}(l - x)$. Given that $\frac{dy}{dx} = 0, y = 0$ when $x = 0$ and $y = 0$ when $x = l$. Prove that $y = \frac{R}{P}\left[\frac{\sin ax}{a} - l\cos ax + l - x\right]$ where $al = \tan al$ and l is the length of strut.

P.T.O.

2) Attempt any two of the following. [16]

a) If $\bar{r} = xi + yj + zk$ then

   i) Prove that $\nabla r^n = nr^{n-2}\bar{r}$

   ii) Find the unit normal vector to the surface $\log (x^2 + y^2 + z^2) = c$

b) Find the directional derivative of $\phi = e^{2x} \cos yz$ at $(0, 0, 0)$ in the direction of the tangent to the curve $x = a \sin t$, $y = a \cos t$, $z = at$ at $t = \pi/4$

c) Show tht $\bar{F} = 2xyz^3 i + x^2 z^3 j + 3x^2 yzk$ is irrotational and find its scalar potential ϕ. Also find a, b, c, such that $\bar{F} = (x + 2y + az)i + (bx - 3y - z)j + (4x + cy + 2z)k$ is irrotational

3) Attempt any two of the following.

a) Fit a curve of the form $y = ax^b$ to the following data.

x:	1	2	3	4	5	6
y:	120	90	60	20	11	5

b) Fit a second degree curve to the following data.

$x =$	1	2	3	4	5	6	7	8	9
$y =$	2	6	7	8	10	11	11	10	9

c) Find the height of son when height of father is 154 cm by obtaining corresponding line of regression from the following data.
Height of Father $(x) =$ 150 152 155 157 160 161 164 166
Height of Son $(y) =$ 154 156 158 159 160 162 161 164

SECTION - II

4) Attempt any two of the following. [16]

a) If X is poison variate such that $p(X=2) = 9\, p(X=4) + 90\, p(X=6)$ Find $p(X=3)$.

b) An insurance salesman sells policies to 5 men, all of identical age in good health. According to the actuarial tables, the probability that a man of this particular age will be alive 30 years hence is $\frac{2}{3}$. Find the probability that in 30 years.

   i) all 5 men
   ii) at least 3 men
   iii) only 2 men
   iv) at least one man will be alive

c) A die is tossed thrice. A succuss is getting 1 or 6 on a toss. Find the mean and variance of the number of successes.

5) Attempt any three of the following. [18]

a) Find Laplace transform of $t\{1 + \sin t\}^{(1/2)}$

b) Find the inverse Laplace transform of $\dfrac{2s}{s^4 + 4}$

c) Find the Laplace transform of $f'(t)$ if $f(t) = \dfrac{1 - \cos 2t}{t}$.

d) Use Laplace transform to solve $(D^2 + 1) y = t^2 + 2t$ where $y(0) = 4$ and $y'(0) = -2$.

6) Attempt any Two of the following: [16]

a) Test the analyticity of the functions $w = \sin z$ and hence derive that
$$\frac{d}{dz}(\sin z) = \cos z.$$

b) Show that the function $u = x^2 - y^2 - 2xy - 2x - y - 1$ is harmonic. Find the conjugate harmonic function v and express $u + iv$ as a functions of z where $z = x + iy$.

c) Integrate z^2 along the straight line OM and also along the path OLM consisting of two line segments OL and OM where O is the orgin, L is the point $z = 3$ and M is the point $z = 3 + i$.

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