



Bharati Vidyapeeth's College Of Engineering For Women-Pune 43

Engineering Mathematics-I

Time – 1½ Hour]

(10th October 2011)

[Max Marks – 30

Instructions: -1] Non-programming calculator is allowed.

2] Assume suitable data if necessary.

Ex.: Solve any five

(i) Reduce into the normal form and find its rank

$$\begin{bmatrix} 1 & 2 & 1 & 0 \\ 3 & 2 & 1 & 2 \\ 2 & -1 & 2 & 5 \\ 5 & 6 & 3 & 2 \\ 1 & 3 & -1 & -3 \end{bmatrix}$$

(ii) Investigate for what values of a and b, the system of equations $2x - y + 3z = 2$; $x + y + 2z = 2$; $5x - y + az = b$ has (i) no solution (ii) unique solution (iii) infinite many solutions. Solve the system when $a = 8$ and $b = 6$.

(iii) Show that $\vec{x}_1, \vec{x}_2, \vec{x}_3$ are linearly independent and \vec{x}_4 depends upon them where $\vec{x}_1 = (1, 2, 4)$, $\vec{x}_2 = (2, -1, 3)$, $\vec{x}_3 = (0, 1, 2)$, $\vec{x}_4 = (-3, 7, 2)$

(iv) Given the Transformation $Y = \begin{bmatrix} 1 & 1 & -2 \\ 2 & -1 & 1 \\ 3 & 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$ Find the co-ordinates (x_1, x_2, x_3) corresponding

to $(2, 3, 0)$ in Y, where $Y = [Y_1, Y_2, Y_3]$

(v) Find Eigen Values & Eigen Vectors $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$

(vi) Verify Cayley-Hamilton Theorem, and find A^{-1} for the following matrix $A = \begin{bmatrix} 1 & 0 & -4 \\ 0 & 5 & 4 \\ -4 & 4 & 3 \end{bmatrix}$

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Engineering Mathematics_I

Unit Test-I

Total marks:30

Time : 1 hr 30 mins

Note: i) answer all the questions ii) figures to the right indicate full marks.

- 1) Define Normal Form for the matrix A , find non Singular matrices P & Q such that PAQ is in the normal form

$$A = \begin{bmatrix} 2 & 1 & -3 & -6 \\ 3 & -3 & 1 & 2 \\ 1 & 1 & 1 & 2 \end{bmatrix} \quad (5 \text{ marks})$$

- 2) Show that the system

$$3x + 4y + 5z = \alpha$$

$$4x + 5y + 6z = \beta$$

$$5x + 6y + 7z = \gamma$$

(4 marks)

Is consistent Only when α, β, γ are in Arithmetic Progression.

- 3) define Linear Dependent system of vectors. Examine for linear dependence or independence system of vectors If dependent, find the relation between them.

$$X_1 = (3, 1, -4), \quad X_2 = (2, 2, -3), \quad X_3 = (0, -4, 1) \quad (5 \text{ marks})$$

- 4) Define Orthogonal matrix. Find the values of a, b, c if

$$\begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix} \text{ is Orthogonal.} \quad (5 \text{ marks})$$

- 5) Find the Eigen values & Eigen vectors of the corresponding matrix

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix} \quad (5 \text{ marks})$$

- 6) State Cayley Hamilton theorem & verify Cayley Hamilton theorem & for the following matrix find A^4 & A^{-1}

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix} \quad (6 \text{ marks})$$



BHARATI VIDYAPEETH'S COLLEGE OF ENGG.FOR WOMEN, PUNE
Unit-Test-I

Sub:-Basic Electrical Engg
Date- 11/10/2011

Marks-30
Time- 1hrs&30Min

- Q.1 a) Define the resistivity & state the factors on which it depends. (4)
b) Define the terms & state their units (4)
i) Work ii) Power
c) A melting furnace is designed to melt 75kg of a typical lead alloy per hour (10)
The melting point of the alloy is 327°C & the initial temperature is 20°C. Latent heat of liquefaction is 50000J/kg. & specific heat of the alloy is 250J/kg. K If efficiency of the furnace is 60% find the Kw. Rating of the furnace.
d) State the effect of temperature on resistances of metallic conductors, (12)
insulating materials & alloy. Give one example of each material with help of sketch.

OR

- Q.2 a) Explain the charging & discharging of nickel cadmium cell with chemical (8)
Reaction with help of neat sketch.
b) With usual notations derive the expression (5)

$$\alpha_2 = \frac{\alpha_1}{1 + a_1(t_2 - t_1)}$$

- c) Derive the expression for insulation resistance of a single core cable. (7)
d) An electric motor is driving a train weighing 100 thousand kg up an inclined (10)
track of 1 in 100 at a speed of km/h. The frictional force of tracks is 10kg. per 1000kg. of
its weight. If the motor operates on 11kv Find the current taken by the motor assuming
the overall efficiency of the system as 70%

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BHARATI VIDYAPEETH'S COLLEGE OF ENGG.FOR WOMEN, PUNE

Unit-Test-I

Sub:-Basic Electrical Engg

Date- 11/10/2011

Marks-30

Time- 1hrs&30Min

Q.1 a) Explain the charging & discharging of lead acid battery with chemical reaction Draw a neat sketch. (10)

b) With usual notations derive the expression $\alpha_2 = \frac{\alpha_1}{1 + a_1(t_2 - t_1)}$ (10)

c) An electrically driven pump motor lifts 80m^3 of water per minute through a height of 12m efficiencies of motor & pump are 70% & 80% respectively. Calculate
1) current drawn by motor if it works on 400v supply. (10)

2) Energy consumption in kwh & cost of energy at the rate of 4Rs /kwh.if pump operates for 2hrs. per day for 30days.Assume 1m^3 . of water=1000kg

OR

Q.2 a) i) Derive the expression for insulation resistance of a single core cable. (05)

ii) A single core copper cable has diameter of 2cm with an insulation of thickness 1.8 cm. The resistivity of copper is $1.73 \times 10^{-8} \Omega \cdot \text{m}$ & that of insulation is $8 \times 10^{12} \Omega \cdot \text{m}$. Determine i) Resistance of conductor ii) insulation resistance if cable length is 100m. (05)

b) State the effect of temp. on resistance of metallic conductors, insulating material & semiconductor Give one example of each material. Draw a neat sketch (10)

c) i) With neat sketch explain the construction & working of lead acid cell. (06)

ii) Compare lead acid cell & Nickel cadmium cell. (04)

Bharati Vidyapeeth's College of Engineering for Women Pune 43.

Department of engineering Science and Allied Engineering.

Applied Chemistry Unit test

Time 1hr

Type A

- Q1. Define 1) Unit cell 2) Co-ordination number 3) point defect. 3
- Q2. Draw the following planes 100, 110, 112 in the cubic crystal lattice. 6
- Q3. Explain what are SWNT and its three types, MWNT and their applications. 6

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Applied Chemistry Unit test

Time 1hr.

Type B

- Q1. Define 1) Lattice plain 2) Atomic packing factor 3) Line defect. 3
- Q2. Draw the 2, 3, 4 fold axes in the cubic crystal lattice. 6
- Q3. Write properties of polythiophene give the doped structure of the polythiophene and its dopants. 6

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Applied Physics Unit test 1

Time 1hr

Type A

Total Marks 15

Q1.Explain interference in a thin parallel sided film of uniform thickness & derive conditions of Maxima & Minima in reflected system. 7

Q2.A parallel beam of sodium light strikes a film of oil floating on water when viewed at an angle of 30° from the normal eighth dark band is seen. Determine the thickness of the film. Refractive index of oil is 1.46. $\lambda=5890\text{\AA}$ 4

Q3.A wedge shaped air film having an angle of 40 sec of an arc is illuminated by monochromatic light & fringes are observed. The distance measured between consecutive bright fringes is 0.12 cm Calculate the wavelength of light used. 4

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Applied Physics Unit test I

Time 1hr.

Total Marks 15

Type B

Q1.Explain formation of Newton's rings & show that the diameters of dark rings are proportional to square root of odd natural nos. 7

Q2. In Newton's rings experiment the diameters of 4th & 12th dark rings are 0.4cm & 0.7 cm respectively. Deduce the diameter of 20th dark ring. 4

Q3.When movable mirror of Michelson's Interferometer is shifted through 0.0589 mm, 200 fringes move across the field. Calculate the wavelength of light used. 4

BHARATI VIDYAPEETH'S COLLEGE OF ENGG.FOR WOMEN, PUNE
Unit-Test-I

Sub:-Basic Civil and Environmental Engineering

Marks-30

Date- 12/10/2011

SET A

Time- 1hrs&30Min

- Q 1: (A) Explain role of Civil Engineer in various construction activities. (5 marks)
(B) Explain applications of Civil Engineering in Mechanical Engineering. (5 Marks)
- Q 2: (A) Write short note on (5 Marks)
- 1) Quantity Surveying and Valuation
2) Surveying
- (B) What is mean by foundation? State functions of foundations. (5 Marks)
- Q 3: (A) Differences between load bearing and framed structure. (7 Marks)
(B) Enlist types of foundations. (3 Marks)
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BHARATI VIDYAPEETH'S COLLEGE OF ENGG.FOR WOMEN, PUNE
Unit-Test-I

Sub:-Basic Civil and Environmental Engineering

Marks-30

Date- 12/10/2011

SET B

Time- 1hrs&30Min

- Q.No.1- Explain the role of civil Engineer in the construction of Dam 5 Marks
Q.No.2. Explain the following Branches of Civil Engineering 5 Marks
a) Geotechnical Engineering b) Structural Engineering.
- Q.No.3 Differentiate between pre-tensioning and post tensioning. 5 Marks
Q.No.4 What are the various causes of settlement of Foundation? 5 Marks
- Q.No.5 Enlist any seven branches of civil Engineering and Explain any two in 5 Marks
Detail.
- Q.No.6 Name the various construction materials used for construction and 5 Marks
Explain a) Cement b) Sand.

- Q.1 A Fixed point is 75 mm from a fixed straight line. Draw the locus of a point P, moving in such a way that its distance from the fixed point 2 times its distance from the fixed straight line. Name the curve and draw the tangent and normal to the curve at any point on the curve. (7)
- Q.2 Points A and B are 100 mm apart. Third point C is 90 mm from A and 65 mm from B. Draw an ellipse passing through the points A, B and C. (7)
- Q.3. Fig.1 shows pictorial view of an object: Draw (1) Sectional front View (Section along A-A), (2) Left hand Side View. (6+5)
- Q.4 Fig.2 shows pictorial view of an object: Draw (1) Sectional front View (Section along A-A), (2) Left hand Side View (3) Top View. (20)
- OR**
- Q.4 Fig.3 shows pictorial view of an object: Draw (1) Sectional front View (Section along A-A), (2) Left hand Side View (3) Top View. (20)

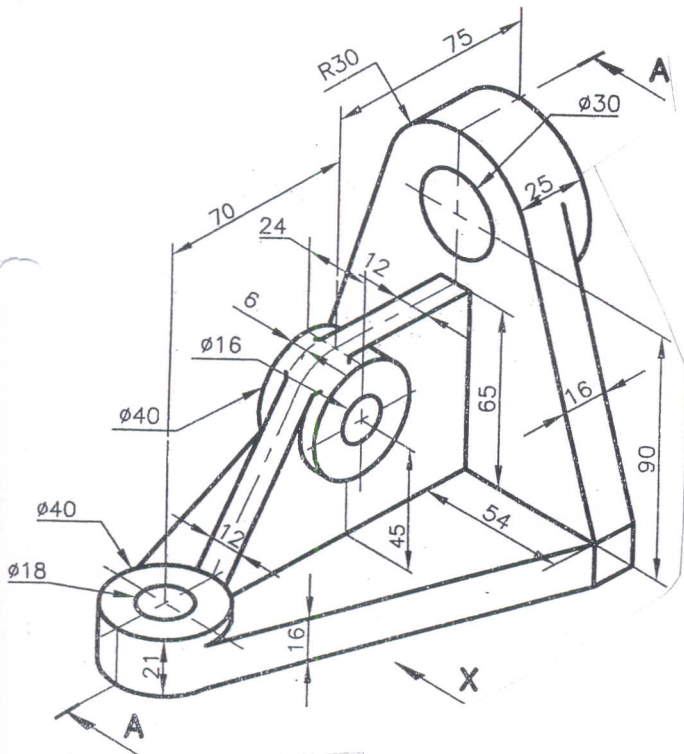


Fig 1

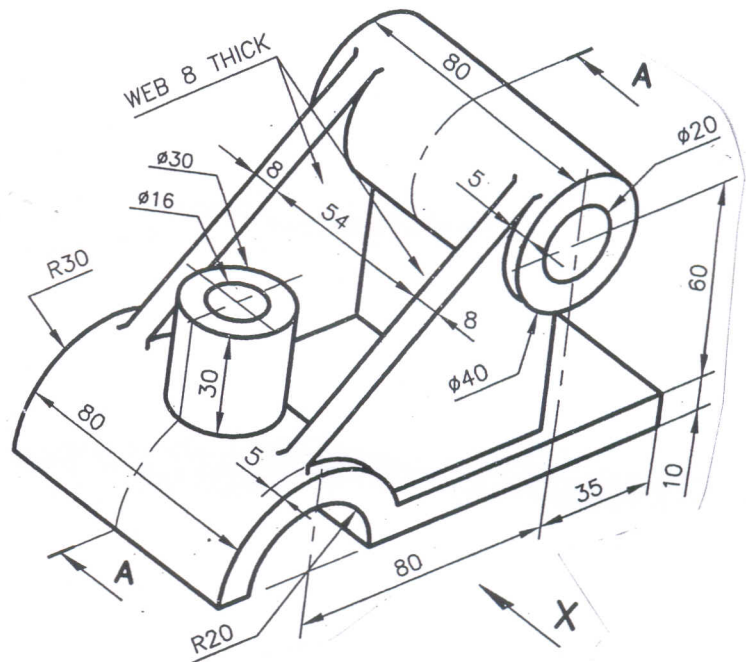


Fig 2

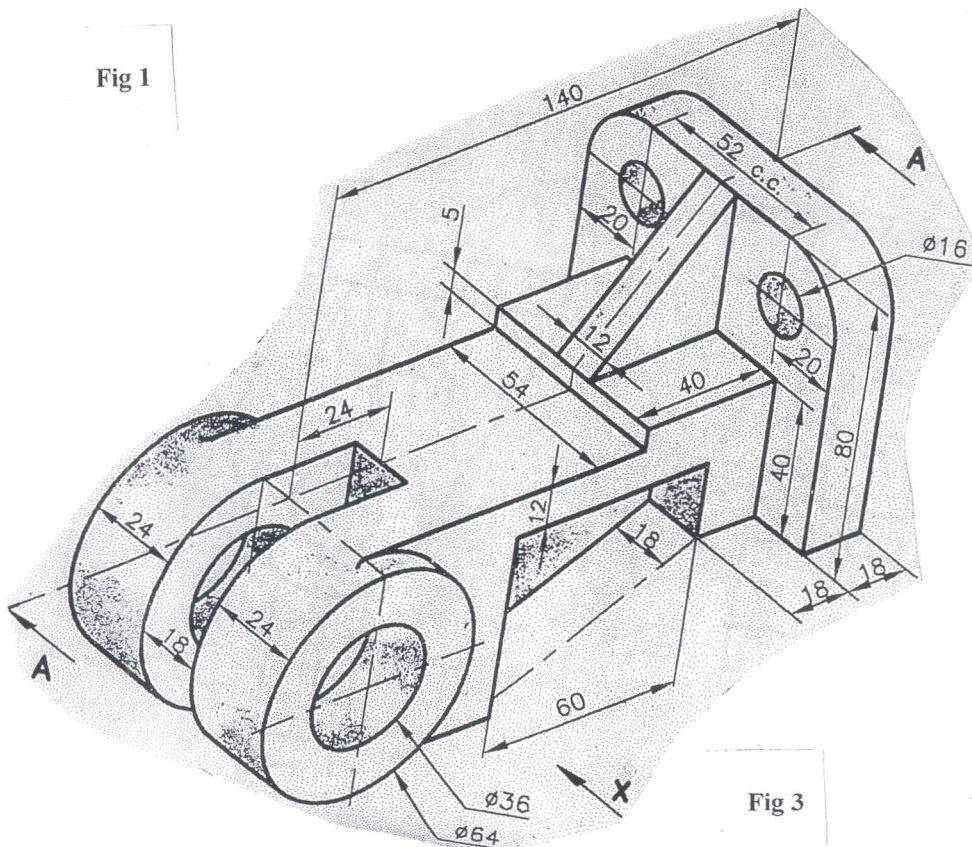


Fig 3