

Subject Code: R13209/R13

Set No - 1

I B. Tech II Semester Regular Examinations August - 2014  
**ENGINEERING DRAWING**

(Common to CE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

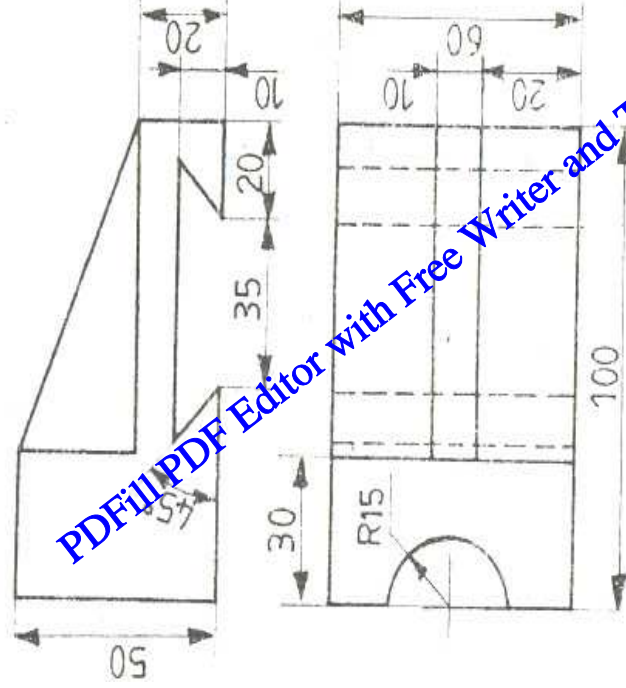
Max. Marks: 70

Question Paper Consists of Part-A and Part-B  
Answering the question in Part-A is Compulsory.  
Three Questions should be answered from Part-B

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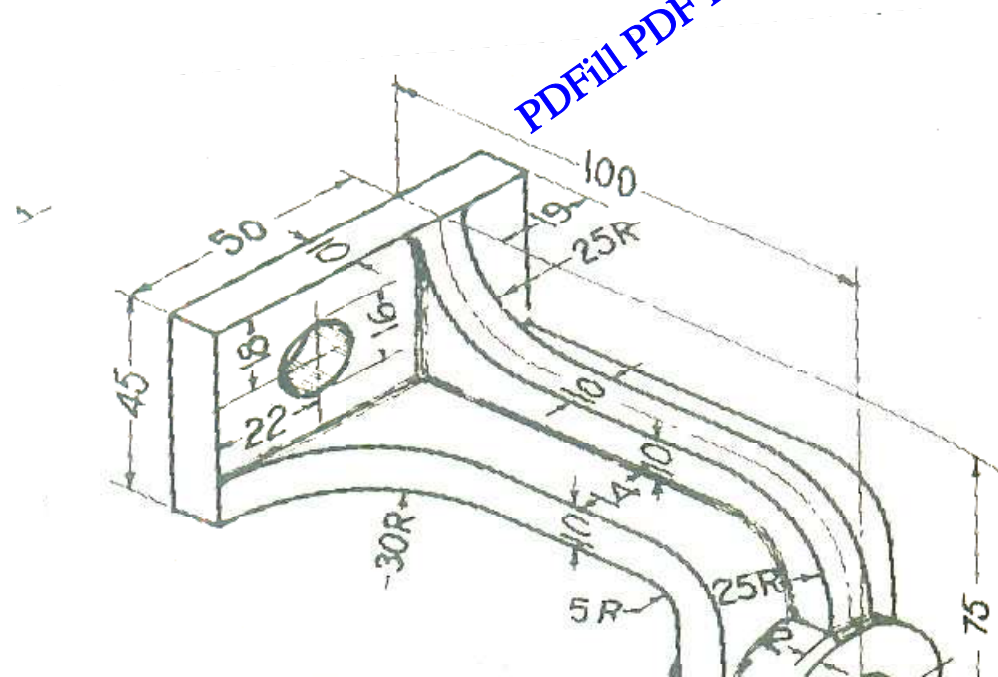
**PART-A**

- 1.(a) Draw the isometric view of the following orthographic views?



- (b) Draw the projections of a Circular lamina of 50mm diameter resting on a point A on its circumference in the H.P its plane inclined at  $45^\circ$  to the HP and (i) the top view of the diameter AB making  $30^\circ$  angle with the VP (ii) the diameter AB making  $30^\circ$  angle with the VP? [16+6]
- PART-B**
- 2.(a) Construct a regular pentagon of 30mm side. When one of its side vertical?  
(b) Construct a Vernier scale of 1:40000 showing kilometers, hectometers and decameters and long enough to measure 5 Km. Mark distance of 2.34 Km and 3.92 Km on the scale? [6+10]
- 3.(a) A vertical line AB, 75mm long, has its end A in the HP and 25mm in front of the VP. Another line AC 100mm long is in the HP and parallel to the VP. Draw the projections of the line joining B and C; and determine its inclination with the HP?

- 3.(b) Draw the projections of a straight line AB of 60mm long, in the following positions:  
(i) Perpendicular to the HP and in the VP and one end on the HP  
(ii) Parallel to and 30 mm in front of the VP and on the HP  
(iii) Inclined at  $30^\circ$  to the VP, in the HP and one end on the VP [6+10]
4. A line AB of 100mm length is inclined at an angle of  $30^\circ$  to HP and  $45^\circ$  to VP. The point A is 15 mm above HP and 20 mm in front of VP. Draw the projections of the line? [16]
5. A thin semi circular plate of 60 mm diameter has its straight edge in the HP and inclined at  $45^\circ$  to the VP; while the surface of the plate is inclined at  $30^\circ$  to the HP. Draw the projections of the plate. [16]
6. A right pentagonal pyramid of base side 20mm and altitude 60mm rests on one of its edges of the base in HP, the base being lifted up until the highest corner in it is 20mm above HP. Draw the projections of the pyramid when the edge on which it rests is made perpendicular to VP? [16]
7. Draw (i) Front view (ii) Side view from the right (iii) Top view [16]



Subject Code: R13209/R13

Set No - 2

I B. Tech II Semester Regular Examinations August - 2014

**ENGINEERING DRAWING**

(Common to CE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

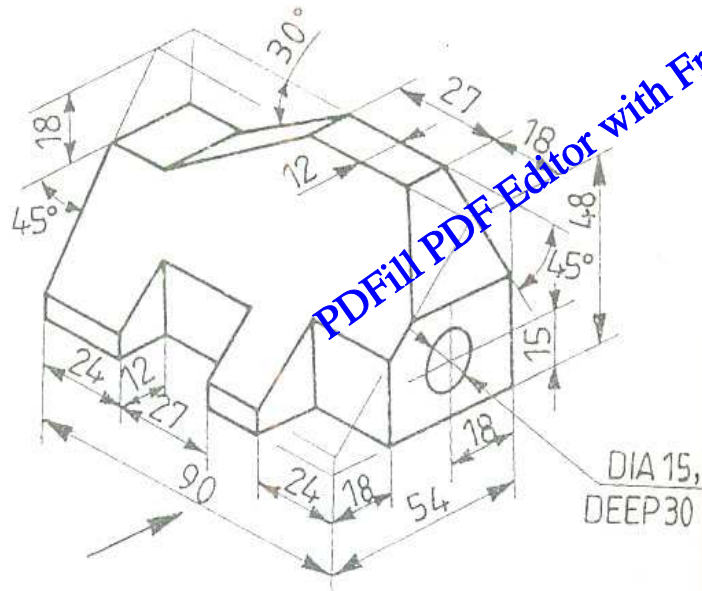
Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

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**PART-A**

- 1.(a) Draw the (i) Front view (ii) Top view (iii) Right side view of the following Pictorial drawing?



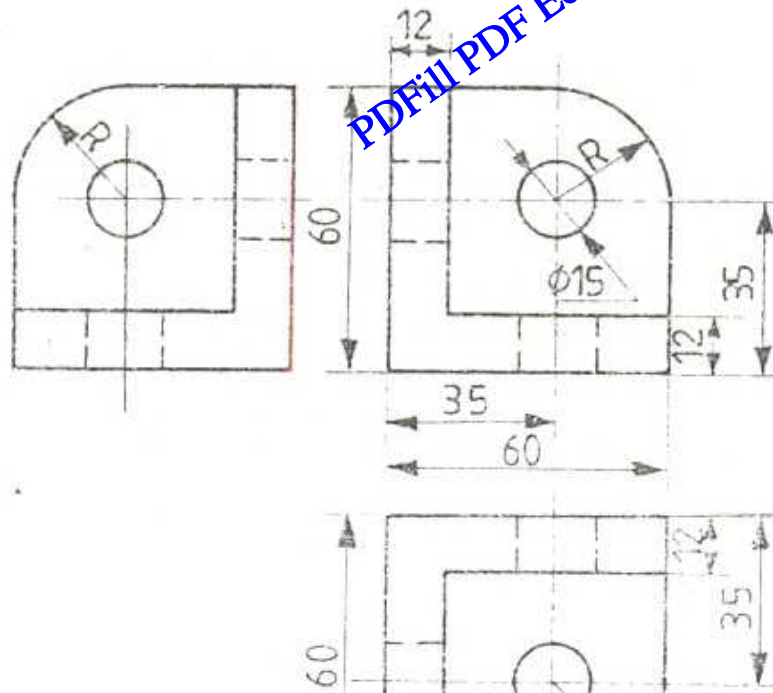
- (b) A tetrahedron of 40 mm side rests with one of its edges on the HP and perpendicular to the VP. The triangular face containing that edge is inclined at  $30^{\circ}$  to HP. Draw its projections.

[16+6]

**PART-B**

- 2.(a) The major axis of an ellipse is 150mm long and the minor axis is 100 mm long. Find the foci and draw the ellipse by Arcs of Circles method. Draw a tangent to the ellipse at

- 3.(b) A line PQ 9 cm long is in the HP and makes an angle of  $30^{\circ}$  with the VP. Its end P is 2.5 cm in front of the VP. Draw its projections? [10+6]
- 4. The top view of a line CD has a length of 80mm and makes  $30^{\circ}$  with the horizontal. The end C is in VP and 52mm above HP. The end D is in HP. Draw the projections of the line. Find true length and true inclinations with HP and VP. Mark its traces on the two planes? [16]
- 5. A regular hexagonal plate of 35mm size has one corner touching VP and another opposite corner touching HP. The plate is inclined at  $60^{\circ}$  to HP and  $30^{\circ}$  to VP. Draw the projections of the plate, neglecting the thickness of it? [16]
- 6. A square headed bolt 25mm diameter, 125mm long and having a square neck has its axis parallel to the HP and inclined at  $45^{\circ}$  to the VP. All the faces of the square head are equally inclined to the HP. Draw its projections neglecting the threads and chamfer? [16]
- 7. Draw the isometric view of the following orthographic views [16]



Subject Code: R13209/R13

Set No - 3

I B. Tech II Semester Regular Examinations August - 2014

**ENGINEERING DRAWING**

(Common to CE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

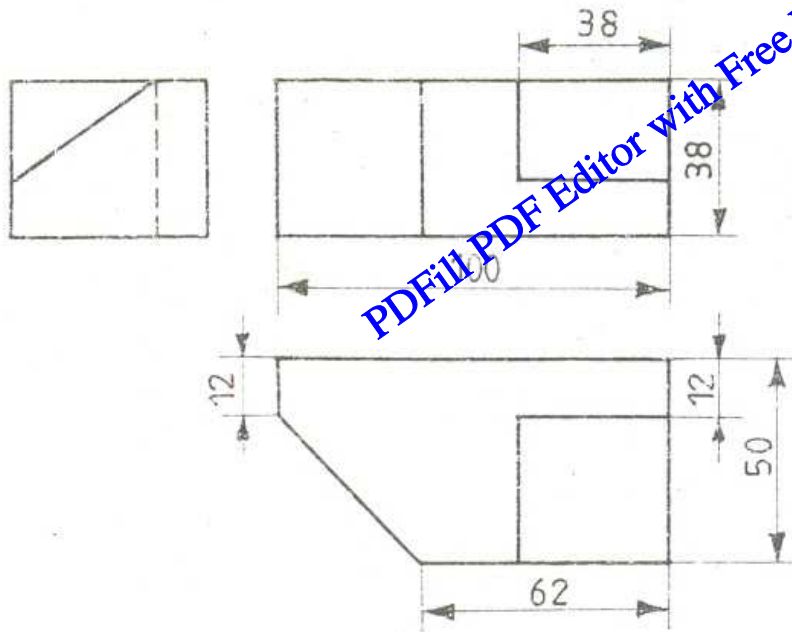
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**PART-A**

1.(a) Draw the isometric view of the following orthographic views?



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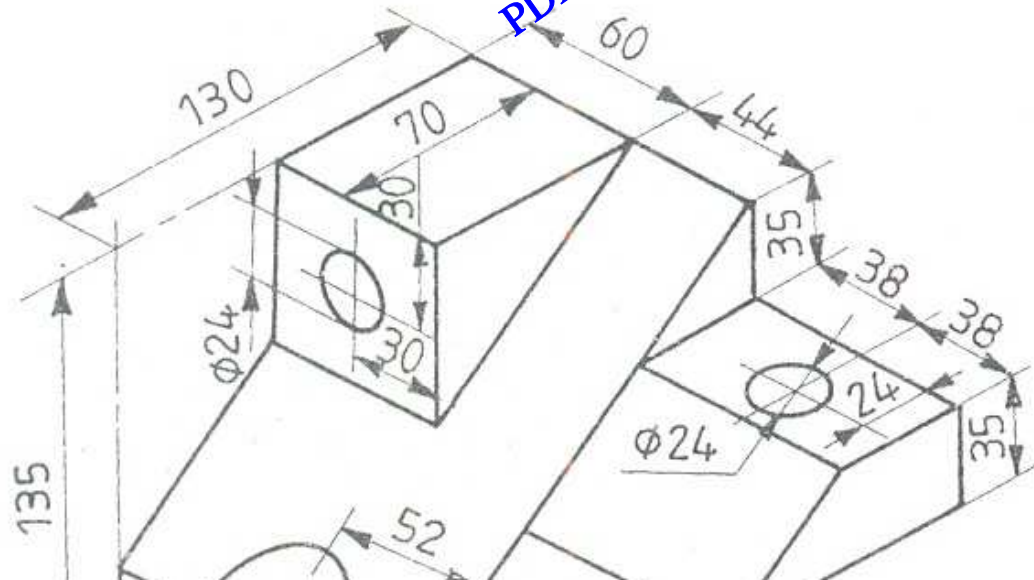
(b) A cube of edges 40 mm is hung by a string attached to one of its corners. Draw its projections when two of its edges containing the corner from which it is hung are equally inclined to the VP.

[16+6]

**PART-B**

2 (a) Construct a Vernier scale of RE=1:80 to read inches and to measure up to 15 yards?

- 3.(b) A point 30mm above xy line is the plan view of two points P and Q. The elevation of P is 45mm above the HP. While that of the point Q is 35mm below the HP. Draw the projections of the points and states their position with reference to the principal planes and the quadrant in which they lie? [8+8]
4. The straight line AB is inclined at  $30^\circ$  to HP, while its top views at  $45^\circ$  to a line xy. The end A is 20mm in front of the VP and it is below the HP. The end B is 75mm behind the VP and it is above the HP. Draw the projections of the line when its VT is 40 mm below. Find the true length of the portion of the straight line which is in the second quadrant and locate its HT? [16]
5. Draw the projections of a circle of 75 mm diameter having the end A of the diameter AB in the HP, the end B in the VP; and the surface inclined at  $30^\circ$  to the HP and at  $60^\circ$  to the VP. [16]
6. The hexagonal pyramid, with side of base 25mm and axis 60mm long, has an edge of its base on VP. Its axis is inclined at  $30^\circ$  to VP and parallel to HP. Draw the projections of the solid. [16]
7. Draw the (i) Front view (ii) Top view (iii) Left side view of the following pictorial projections? [16]



Subject Code: R13209/R13

Set No - 4

I B. Tech II Semester Regular Examinations August - 2014

**ENGINEERING DRAWING**

(Common to CE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

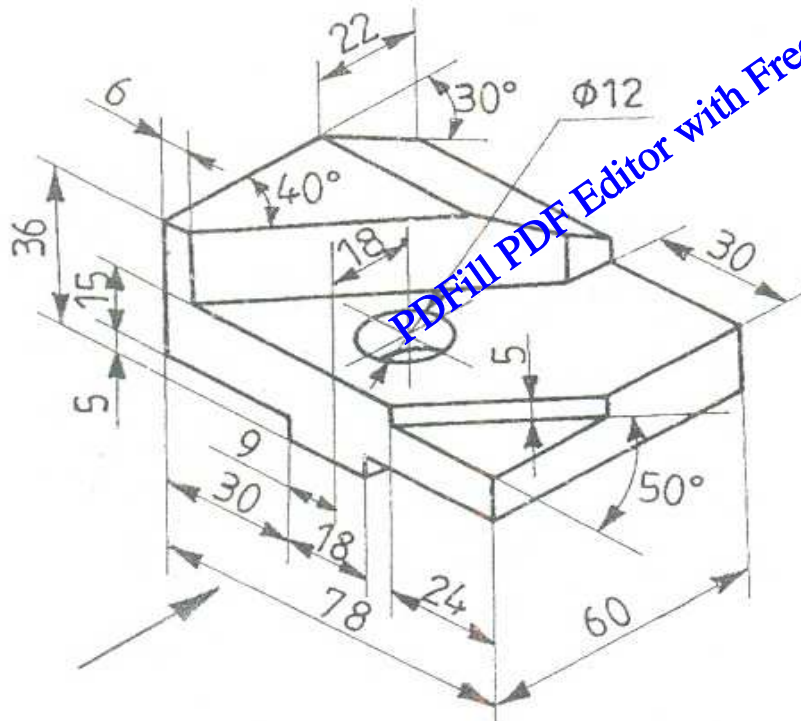
Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

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**PART-A**

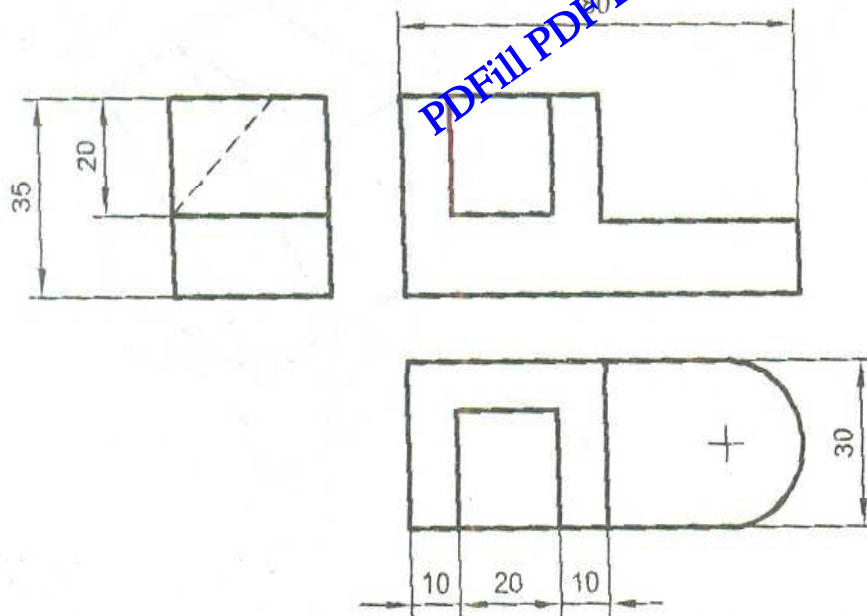
- 1.(a) Draw the (i) Front view (ii) Top view (iii) Right side view of the following pictorial projections?



- (b) A car is moving at a speed of 360 km/hour. Draw a diagonal scale to represent 6 km by 1 cm to show a maximum distance of 60 km. Measure the distance travelled by the car at 6 minutes 10 seconds?



- 3.(b) A 100 mm long line is parallel to and 40 mm above the HP. Its two ends are 25mm and 50mm in front of the VP respectively. Draw its projections and find its inclination with the VP? [8+8]
4. A straight line AB of 75mm long has the end A on VP and the end B on HP. The line is inclined at  $30^\circ$  to the VP and its front view makes an angle of  $45^\circ$  with xy. Draw the projections of the line and add the left side view and locate the traces? [16]
5. A thin  $45^\circ$  set-square has its longest edge 250 mm long is on the VP and inclined at  $30^\circ$  to HP. Its surface makes an angle of  $45^\circ$  with VP. Draw its projections. [16]
6. Draw the projections of a pentagonal prism, base 25mm side and axis 50mm long, resting on one of its rectangular faces on the HP, with the axis inclined at  $45^\circ$  to the VP. [16]
7. Draw the isometric view of the following orthographic views? [16]





Subject Code: R13203/R13

Set No - 1

I B. Tech II Semester Regular Examinations August - 2014

**ENGINEERING PHYSICS**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of Part-A and Part-B

Answering the question in Part-A is Compulsory,

Three Questions should be answered from Part-B

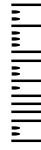
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**PART-A**

- 1.(i) Write a note on colours of thin films.
- (ii) Describe the FCC sub lattice and calculate its atomic packing factor.
- (iii) Discuss the temperature dependence of magnetic susceptibility in dia, para and ferromagnetic materials.
- (iv) How will you measure absorption coefficient of a material?
- (v) What are matter waves? Derive the expression for de Broglie's wavelength.
- (vi) What are direct and indirect band gap semiconductors? [4+4+3+3+4+4]

**PART-B**

- 2.(a) State and explain Brewster's law.
- (b) Define Drift & Diffusion currents and derive Einstein's equation.
- (c) For copper density  $d= 8.92 \times 10^{-8} \text{ kg/m}^3$ , resistivity  $\rho = 1.73 \times 10^{-8} \Omega\text{-m}$ , atomic weight  $M= 63.5$ . Calculate the mobility of free electrons in copper, obeying classical laws. [4+8+4]
- 3.(a) What is population inversion and how can it be achieved?
- (b) Explain the Principle, construction and working of a Nicol prism with neat diagram.
- (c) Draw the diagram to show the variation of the Fermi level with temperature and impurity concentration in case of n-type semiconductor. [4+8+4]
- 4.(a) Differentiate between soft and hard superconductors.
- (b) Explain the three level and four level laser systems. What are the advantages of four level laser system over three level laser system?
- (c) In Newton's rings experiment, diameter of the tenth dark ring due to wavelength  $6000\text{\AA}$  in air is 0.5 cm. Find the radius of curvature of the lens. [4+8+4]
- 5.(a) Explain the polarization mechanism in dielectrics.
- (b) Explain BCS theory with key note of cooper pairs.
- (c) State few applications of laser. [4+8+4]
- 6.(a) What are the draw backs of classical free electron theory?
- (b) What are the polar and non-polar dielectrics? Derive Clausius-Mosotti equation.
- (c) Mention the applications of Josephson's effect. [4+8+4]
- 7.(a) Distinguish between n-type and p-type semiconductors.
- (b) Derive an expression for electrical conductivity of a conducting material based on quantum mechanical treatment.
- (c) The penetration depths for lead at 3 K and 7.1 K are 39.6nm and 173nm respectively. Calculate the critical temperature for lead. [4+8+4]



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Set No - 2

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(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

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Max. Marks: 70

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**PART-A**

- 1.(i) What are Newton's rings? Why are they circular?
  - (ii) Describe the BCC sub lattice and calculate its atomic packing factor.
  - (iii) Define magnetic susceptibility. Why is it negative for diamagnetic materials?
  - (iv) What are the necessary conditions of physically acceptable wave function?
  - (v) Write the Maxwell's electromagnetic equations in differential or integral form.
  - (vi) How does the Fermi level change with temperature in extrinsic semiconductors?
- [4+4+3+3+4+4]

**PART-B**

- 2.(a) Distinguish between Fresnel and Fraunhofer diffractions.
  - (b) Define Drift & Diffusion currents and derive the expressions for drift and diffusion current densities.
  - (c) Find the relaxation time of conduction electrons in a metal if its resistivity is  $1.54 \times 10^{-8} \Omega \text{m}$  and it has  $5.8 \times 10^{28}$  conduction electrons per cubic metre.
- [4+8+4]
- 3.(a) Explain Step Index and Graded index optical fibers.
  - (b) Give the theory of plane diffraction grating. Obtain the condition for the formation of  $n^{\text{th}}$  order maximum.
  - (c) In a Hall coefficient experiment, a current of 0.25A is sent through a metal strip having thickness 0.2mm and width 5mm. The Hall voltage is found to be 0.15mV when a magnetic field of 2000 gauss is used. What is the carrier concentration?
- [4+8+4]
- 4.(a) Derive the relation between polarization vector  $\vec{P}$ , the electric field  $\vec{E}$  and displacement vector  $\vec{D}$ .
  - (b) Derive an expression for acceptance angle of fiber in terms of the refractive indices of core and cladding of an optical fiber. What is meant by acceptance cone?
  - (c) Distinguish between the spectra formed by a prism and a grating.
- [4+8+4]
- 5.(a) How matter waves are different from Electromagnetic waves?
  - (b) Explain the electronic polarisability and show that electronic polarisability for a monochromatic gas increases as the size of the atoms becomes larger.

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Set No - 3

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[4+4+3+3+4+4]

**PART-B**

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[4+8+4]

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[4+8+4]

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- (c) Distinguish between the spectra formed by a prism and a grating.

[4+8+4]

- 5.(a) Explain the polarization mechanism in dielectrics.
- (b) Explain BCS theory with key note of Cooper pairs.
- (c) State few applications of laser.

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I B. Tech II Semester Regular Examinations August - 2014

**ENGINEERING PHYSICS**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

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- (v) Write the Maxwell's electromagnetic equations in differential or integral form.
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[4+4+3+3+4+4]

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[4+8+4]

- 3.(a) Explain Step Index and Graded index optical fibers.
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- (c) In a Hall coefficient experiment, a current of 0.25A is sent through a metal strip having thickness 0.2mm and width 5mm. The Hall voltage is found to be 0.15mV when a magnetic field of 2000 gauss is used. What is the carrier concentration?

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- 4.(a) Differentiate between soft and hard superconductors.
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[4+8+4]

- 5.(a) How matter waves are different from Electromagnetic waves?
- (b) Explain the electronic polarisability and show that electronic polarisability for a monochromatic gas increases as the size of the atoms becomes larger.
- (c) Find the numerical aperture and acceptance angle of a fiber of core index 1.4 and fractional

## I B. Tech II Semester Regular Examinations August - 2014

## MATHEMATICS-III

(Common to All Branches)

**Time: 3 hours****Max. Marks: 70**

Question Paper Consists of Part-A and Part-B

Answering the question in Part-A is Compulsory,

Three Questions should be answered from Part-B

\*\*\*\*\*

**PART-A**

- 1.(i) Write down the properties of orthogonal matrix.
- (ii) Write the nature of  $2y_1^2 + 4y_2^2 + 5y_3^2$ .
- (iii) If A and B are non-singular matrices of same order, show that AB and BA have same eigen values.
- (iv) Find the area of loop of the curve  $r^2 = a^2 \cos 2\theta$
- (v) Find the moment of inertia of a circle A of radius R relative to the centre O.
- (vi) Evaluate  $\int_0^{\infty} \frac{x^6(1-x^{10})dx}{(1+x)^{24}}$
- (vii) If  $F$  is a conservative vector field show that  $\text{curl } F = 0$ .
- (viii) Write down the physical interpretation of Green's theorem.

[3+3+3+3+2+3+2]

**PART - B**

- 2.(a) Reduce the matrix  $\begin{bmatrix} 1 & 0 & -3 & 2 \\ 0 & 1 & 4 & 5 \\ 1 & 3 & 2 & 0 \\ 1 & 1 & -2 & 0 \end{bmatrix}$  to normal form and find its rank.
  - (b) Solve, by Gauss-Seidal method, the equations  
 $9x - 2y + z - t = 50$   
 $x - 7y + 3z + t = 20$   
 $-2x + 2y + 7z + 2t = 22$   
 $x + y - 2z + 6t = 18$ .
3. Diagonalise the matrix  $A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$  and hence find  $A^4$ . [8+8]
- 4.(a) Find the volume of solid generated by the revolution of the cardioid  $r = a(1 + \cos \theta)$  about  $\theta = 0$ . [16]
- (b) Evaluate  $\iint_R (\sqrt{xy} - y^2) dx dy$  where R is triangle with vertices at (0,0), (10,1), (1,1). [8+8]
- 5.(a) Show that  $\int_0^1 x^3 \left[ \log \left( \frac{1}{x} \right) \right]^4 dx = \frac{3}{128}$ .
- (b) Prove that  $\int_0^4 \sqrt{x(4-x)^2} dx = 64\beta \left( \frac{3}{2}, \frac{5}{2} \right)$ . [8+8]

6.(a) Find the angle between the surfaces  $x^2 + y^2 + z^2 = 9$  and  $z = x^2 + y^2 - 3$  at the point  $(2, -1, 2)$

(b) Prove that  $\nabla \left[ \nabla \cdot \frac{\vec{r}}{r} \right] = \frac{-2}{r^3} \vec{r}$

[8+8]

7.(a) Use Stokes theorem to evaluate the integral  $\int_C \mathbf{A} \cdot d\mathbf{r}$  where  $\mathbf{A} = 2y^2\mathbf{i} + 3x^2\mathbf{j} - (2x + z)\mathbf{k}$ , and C is the boundary of the triangle whose vertices are  $(0, 0, 0)$ ,  $(2, 0, 0)$ ,  $(2, 2, 0)$

(b) Find the workdone in moving a particle in the force field  $\mathbf{F} = 3x^2\mathbf{i} + \mathbf{j} + z\mathbf{k}$  along the straight line from  $(0, 0, 0)$  to  $(2, 1, 3)$

[8+8]

Subject Code: R13202/R13

Set No - 2

I B. Tech II Semester Regular Examinations August - 2014

**MATHEMATICS-III**

(Common to All Branches)

Time: 3 hours

Max. Marks: 70

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**PART-A**

- 1.(i) Express  $\begin{bmatrix} 3 & 7 \\ 4 & 5 \end{bmatrix}$  as sum of a symmetric and skew-symmetric matrices.
- (ii) When does a non homogeneous system consistent?
- (iii) Define the latent root and latent vector.
- (iv) Find the volume of a sphere of radius 'a'.
- (v) Find the moment of inertia of a hallow sphere about a diameter. Its external and internal radii being 5 meters and 4 meters.
- (vi) Evaluate  $\int_0^{\infty} \sqrt{x}e^{-x^3} dx$
- (vii) If **A** is a vector function, find Div (Curl **A** )
- (viii) Write down the physical interpretation of Stokes's theroem.

[3+2+3+3+3+3+3+2]

**PART - B**

- 2.(a) Reduce the matrix  $\begin{bmatrix} 3 & 1 & 4 & 6 \\ 2 & 1 & 2 & 4 \\ 4 & 2 & 5 & 8 \\ 1 & 1 & 2 & 2 \end{bmatrix}$  to Echelon form and find its rank.
- (b) Solve, by LU Decomposition method, the equations
$$\begin{aligned} x + 2y + 3z &= 10 \\ 3x + y + 2z &= 13 \\ 2x + 3y + z &= 13. \end{aligned}$$

[8+8]

3. Verify Cayley-Hamilton theorem for  $A = \begin{bmatrix} 2 & -1 & 0 \\ 3 & 1 & -1 \\ 2 & 0 & 3 \end{bmatrix}$  and hence find  $A^{-1}$ .

[16]

- 4.(a) Find the length of the loop of the curve  $3ay^2 = x(x - a)^2$
- (b) Find the volume of the solid generated by the revolution of the cardioid



Subject Code: R13202/R13

Set No - 2

6. (a) Find the work done in moving a particle in the force field  
 $\mathbf{F} = 2x^2\mathbf{i} + (2yz - x)\mathbf{j} + y\mathbf{k}$  along the space curve  $x = 3t^2, y = t, z = 3t^2 - t$  from  
 $t=0$  to  $t=1$ .
- (b) Prove that  $\text{curl}(a \times b) = a \text{ div } b - b \text{ div } a + (\vec{b} \cdot \nabla)a - (a \cdot \nabla)b$
- 7.(a) Verify the divergence theorem for  
 $\mathbf{F} = 4xy\mathbf{i} - y^2\mathbf{j} + xz\mathbf{k}$ , over the cube bounded by  $x = 0, x = 1, y = 0, y = 1,$   
 $z=0$  and  $z = 1$ .
- (b) Evaluate  $\iint_S \mathbf{A} \cdot \mathbf{n} \, ds$  where  $\mathbf{A} = yz\mathbf{i} + zx\mathbf{j} + xy\mathbf{k}$  and  $S$  is the part of the sphere  
 $x^2 + y^2 + z^2 = 9$  which lies in the first octant.

[8+8]

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I B. Tech II Semester Regular Examinations August - 2014

MATHEMATICS-III

(Common to All Branches)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of Part-A and Part-B
Answering the question in Part-A is Compulsory,
Three Questions should be answered from Part-B

\*\*\*\*\*

PART-A

- 1.(i) Define rank of a matrix.
(ii) Write the nature of -3y1^2 - 2y2^2 - y3^2
(iii) Find the matrix of the quadratic form q = x^2 - 6xy + 3y^2.
(iv) Find the length of the arc ay^2 = x^3 from the vertex to the ordinate x=5a.
(v) Find the moment of inertia of a circle A of radius R relative to the centre O.
(vi) Define beta and Gamma functions and write the relation between them.
(vii) Show that V= 3y^4z^2i + 4x^3z^2j + 6x^2y^3k is solenoidal.
(viii) Write down the physical interpretation of Gauss's divergence theorem.

[3+3+3+3+3+2+3+2]

PART - B

2.(a) Find the inverse of a matrix [ -1 -3 2 -1 ; 1 1 -1 0 ; 2 -5 2 -3 ; -1 1 0 1 ], using elementary operations.

(b) If consistent, solve the system of equations

x + y + z + t = 4
x - z + 2t = 2
y + z - 3t = -1
x + 2y - z + t = 3.

[8+8]

3.(a) Find the latent values and latent roots of the matrix A = [ 2 1 1 ; 2 3 4 ; -1 -1 -2 ].

(b) Verify Cayley-Hamilton theorem and hence find A^-1 if A = [ 3 1 1 ; -1 5 -1 ; 1 -1 3 ].

6. (a) Find the directional derivative of  $\phi(x, y, z) = xy^2 + yz^2$  at the point  $(2, -1, 1)$  in the direction of  $i + 2j + 2k$
- (b) Prove that  $\text{Div}(A \times B) = B \cdot \text{curl } A - A \cdot \text{curl } B$  [8+8]
- 7.(a) Evaluate using the divergence theorem  $\iint_S (\mathbf{F} \cdot \mathbf{n}) d\mathbf{s}$  where S is the surface of the sphere  $x^2 + y^2 + z^2 = b^2$  in the first octant and  $\mathbf{F} = yi + zj + xk$
- (b) If  $\mathbf{A} = (3xy - 2y^2)i + (x - y)j$ , evaluate  $\int_C \mathbf{A} \cdot d\mathbf{r}$  along the curve C in xy-plane given by  $y = x^3$  from the point  $(0, 0)$  to  $(2, 8)$  [8+8]

Subject Code: R13202/R13

I B. Tech II Semester Regular Examinations August - 2014

**MATHEMATICS-III**

(Common to All Branches)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
 Answering the question in **Part-A** is Compulsory,  
 Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

- 1.(i) Show that  $\begin{bmatrix} -1 & 1 & -1 \\ 3 & -3 & 3 \\ 5 & -5 & 5 \end{bmatrix}$  is idempotent.
- (ii) When does the non homogeneous system consistent?
- (iii) Define positive definite, negative definite and indefinite.
- (iv) Find the volume of a sphere of radius 'a'.
- (v) Find the surface area of the solid generated by the revolution about the x-axis of the area bounded by the curves  $y = f(x)$ , the x-axis the ordinates  $x = a$  &  $x = b$ .
- (vi) Define Gamma function and Beta function and write the relation between them.
- (vii) Find the normal to the surface  $x^2 + y^2 + 2z^2 = 26$  at the point (2, 2, 3)
- (viii) Write the statement of Green's theorem.

[3+3+3+3+3+2+3+2]

**PART B**

- 2.(a) If  $A = \begin{bmatrix} 1 & -1 & -1 & 2 \\ 4 & 2 & 2 & -1 \\ 2 & 2 & 0 & -2 \end{bmatrix}$ , find two non-singular matrices P and Q such that PAQ is in the normal form.

- (b) Test for consistency and solve

$$5x + 3y + 7z = 4$$

$$3x + 26y + 2z = 9$$

$$7x + 2y + 10z = 5.$$

[8+8]

3. Reduce the quadratic form  $q = x_1^2 + 2x_2^2 + 3x_3^2 + 4x_1x_2 - 2x_2x_3 + 6x_3x_1$  into a canonical form by diagonalising the matrix of the quadratic form.

[16]

- 4.(a) Trace the curve  $y = \frac{x^2+2x}{x+1}$ .

- (b) Find the volume of the solid generated by the revolution of the curve

6. (a) Show that the vector  $[(x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k]$  is irrotational and find the scalar potential.
- (b) Find the acute angle between the surface  $xy^2z = 2$  and  $x^2 + y^2 + z^2 = 6$  at the point  $(2, 1, 1)$ . [8+8]
- 7.(a) Verify the divergence theorem for  $\mathbf{F} = 4xyi - y^2j + xzk$ , over the cube bounded by  $x = 0, x = 1, y = 0, y = 1, z = 0$  and  $z = 1$ .
- (b) Evaluate  $\iint_S (\mathbf{curl} \mathbf{A}) \cdot \mathbf{n} \, ds$  where  $\mathbf{A} = yi + (x - 2z)j - xyk$  and S is the surface of the sphere  $x^2 + y^2 + z^2 = 4$  above the  $xy$ -plane. [8+8]

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**I B. Tech II Semester Regular Examinations August - 2014  
MATHEMATICS-II (MATHEMATICAL METHODS)****(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)****Time: 3 hours****Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**  
 Answering the question in **Part-A** is Compulsory,  
 Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

- 1.(i) Write iterative scheme to find the  $n^{\text{th}}$  root of a real number  $K(>0)$ .
- (ii) Find  $\Delta \log f(x)$ .
- (iii) Find half range Fourier sine series of  $f(x) = e^x$  in  $(0, 1)$ .
- (iv) Prove that  $Z(\sinh nt) = \frac{z \sinh t}{z - 2z \cosh t + 1}$ .
- (v) Using Euler's method, find the value of  $y(0.5)$  (take  $h = 0.25$ ) and compare with the exact solution of the equation  $y' = x^2 y$ ,  $y(0) = 1$
- (vi) If  $F_p$  is complex Fourier transform of  $f(x)$ , then find the complex Fourier transform of  $f(x) \sin ax$ .  
[3+3+3+3+5+5]

**PART-B**

- 2.(a) Using Newton-Raphson method find the root of the equation  $x + \log_{10} x = 3.375$  correct to four decimal places.
  - (b) The population of a town in the decimal census is given below. Estimate the population of a town for the year 1895  
[8+8]
- |              |      |      |      |      |      |
|--------------|------|------|------|------|------|
| Year X       | 1971 | 1981 | 1991 | 2001 | 2011 |
| Population Y | 146  | 166  | 181  | 193  | 201  |
- 3.(a) Find positive root of  $x^3 - 5x + 3 = 0$  using Regula falsi method up to 4 steps.
  - (b) Using Lagrange's interpolation formulae find the value of  $y$  (12) from the data  
[8+8]
- |   |    |    |    |    |
|---|----|----|----|----|
| X | 5  | 7  | 9  | 13 |
| Y | 11 | 13 | 18 | 27 |
- 4.(a) Solve  $y' = x^2 y + 1$ ,  $y(0)=1$  using Taylor's method up to  $3^{\text{rd}}$  degree term and compute  $y(0.1)$ .  
[8+8]
  - (b) Find the fourier series of  $f(x) = x \sin x$  in  $(-\pi, \pi)$ .  
[8+8]

Subject Code: R13207/R13

Set No - 1

5.(a) Find half range cosine series of  $f(x) = \begin{cases} 1, & 0 < x < \frac{\pi}{2} \\ -1, & \frac{\pi}{2} < x < \pi \end{cases}$ .

(b) Use Runge-Kutta 4<sup>th</sup> to compute  $y(1.25)$  given that  $\frac{dy}{dx} = \frac{x^2 + y}{x}$ ,  $y(1) = 2$

6.(a) Find Fourier transform  $f(x) = \begin{cases} x & \text{if } |x| \leq 1 \\ 0 & \text{if } |x| > 1 \end{cases}$ .

(b) Find Z-transform of  $n a^n$ .

7.(a) Find Fourier sine transform of  $e^{-x}$  and hence deduce the inversion formula.

(b) Solve the difference equation  $u_{n+2} - u_n = 2^n$ ,  $u_0 = 0$ ,  $u_1 = 1$ , using Z-transforms.

[8+8]

[8+8]

[8+8]

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Subject Code: R13207/R13

Set No - 2

I B. Tech II Semester Regular Examinations August - 2014

**MATHEMATICS-II (MATHEMATICAL METHODS)**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

- 1.(i) Using bisection method find the first four approximations to the real root of  $3x = e^x$
- (ii) Prove that  $\Delta\left(\frac{1}{f(x)}\right) = \frac{-\Delta f(x)}{f(x)f(x+1)}$ .
- (iii) If  $Z(n^2) = \frac{z^2 + z}{(z-1)^3}$  find  $Z(n^3)$ .
- (iv) Find the Half range Fourier sine series of  $f(x) = |x|$  in  $(0, 1)$
- (v) If  $y' = 2x - y$ ,  $y(1) = 3$ , find the solution, up to third degree term, using Picard's method.
- (vi) Prove  $F[x^n f(x)] = (-i)^n \frac{d^n}{dp^n} [F(p)]$ .

[3+3+3+3+5+5]

**PART - B**

- 2.(a) Using Newton - Raphson method, find a root of the equation  $2x - 3\sin x = 5$  near  $x=5$  correct to three decimal places.
- (b) Given that  $f(6500) = 80.8084$ ,  $f(6510) = 80.6846$ ,  $f(6520) = 80.7456$ ,  $f(6530) = 80.8084$ , find  $f(6526)$  using Gauss backward interpolation formula.
- [8+8]
- 3.(a) Find a positive root of  $2x = 3 + \cos x$  by using Newton-Raphson method correct to three decimal places. (Use Bisection method for the first approximation).
- (b) Using Lagrange's Interpolation formula for the value of  $y(6)$  given the following table

X	1	2.5	5	7
Y	2.25	4.13	7.25	9.0

[8+8]

- 4.(a) Solve  $y' = y + x$ ,  $y(0) = 1$  using Picard's method up to third approximation and hence

**Subject Code: R13207/R13**

**Set No - 2**

6.(a) Find the Fourier transform of  $\frac{1}{\sqrt{|x|}}$ .

(b) Find Z-transform of  $n^2 e^{n\theta}$ .

7.(a) Find Fourier cosine transform of  $\frac{1}{1+x^2}$  and hence find Fourier sine transform of  $\frac{x}{1+x^2}$ . [8+8]

(b) Solve  $y(n+2) + 3y(n+1) + 2y(n) = 0$ ,  $y(0) = 0$ ,  $y(1) = 1$  using Z-Transform.

[8+8]

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Subject Code: R13207/R13

Set No - 3

I B. Tech II Semester Regular Examinations August - 2014

**MATHEMATICS-II (MATHEMATICAL METHODS)**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

- 1.(i) Find reciprocal of a real number 19 using Regula falsi method.
- (ii) Expand the shift operator E in terms of exponential function.
- (iii) Employ Taylor's method to obtain the values of  $y(1.1)$  for the differential equation  $y' = xy^{1/3}, y(1) = 1$ .
- (iv) A sinusoidal voltage  $E \cos \omega t$  is passed through a half wave rectifier which clips the negative portion of the wave. Develop the resulting periodic function  $u(t) = \begin{cases} 0 & , -\frac{T}{2} < t < 0 \\ E \cos \omega t, & 0 < t < \frac{T}{2} \end{cases}, T = \frac{2\pi}{\omega}$  as Fourier series.
- (v) Prove that  $F_s \left[ \frac{d}{dx} F(x) \right] = -p F_c(p)$
- (vi) Find the Z-transform of  $\sin((n+1)t)$ .

[3+3+3+5+3+5]

**PART - B**

- 2.(a) By using Regula-Falsi method for a real root of  $xe^x = 2$  up to 4 stages.
- (b) Using a forward difference formula, find  $y(11)$  from the given table

X	1	6	11	16	21	26
Y	5	10	14	18	24	32

[8+8]

- 3.(a) Using Newton-Raphson formula, find the root of  $e^x - x^3 + \cos 25x = 0$  around  $x = 4.5$  correct to 3 decimal places

4.(a) Using Euler's method, solve for y (0.6) from  $y' = -2xy$ ,  $y(0) = 1$  using step size 0.2.

(b) Find the Fourier series of  $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \frac{\pi}{4}, & 0 < x < \pi \end{cases}$ .

[8+8]

5.(a) Represent the function as Fourier cosine series  $f(x) = \begin{cases} \frac{\pi}{2}, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$ .

(b) Use Runge-Kutta 4<sup>th</sup> order to compute y(1.2) for the equation  $y' = \frac{x^2 + y}{x}$ ,  $y(1) = 2$ .

[8+8]

6.(a) Find the Fourier cosine transform of  $\frac{e^{-ax}}{x}$ .

(b) Find  $Z^{-1} \left[ \frac{8z - z^3}{(4-z)^3} \right]$ .

[8+8]

7.(a) Find Fourier cosine transform of  $f(x) = \begin{cases} \sqrt{1-x} & 0 \leq x \leq a \\ 0 & \text{if } |x| > a \end{cases}$ .

(b) Solve  $u_{n+2} - 6u_{n+1} + 9u_n = 0$  using Z-transform.

[8+8]

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Subject Code: R13207/R13

Set No - 4

I B. Tech II Semester Regular Examinations August - 2014

**MATHEMATICS-II (MATHEMATICAL METHODS)**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

- 1.(i) Evaluate  $\sqrt[4]{29}$  to four decimal places by Newton-Raphson method.
- (ii) If the interval of differencing is unity, find  $\Delta^2 \sin(px + q)$ .
- (iii) Using Taylor's series method obtain  $y(0.2)$  for the differential equation  $y' + 2y = 3e^{2x}$ ,  $y(0) = 0$ .
- (iv) Find the Fourier series of  $f(x) = |\cos x|$  in  $(-\pi, \pi)$ .
- (v) Find Fourier transform of  $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$ .
- (vi) Prove that  $Z(\cos nt) = \frac{z(z - \cos t)}{z^2 - 2z \cos t + 1}$ .

[3+3+3+3+5+5]

**PART - B**

- 2.(a) Find a real root of  $x^3 - 4x - 9 = 0$  using Bisection method up to 4 stages.
- (b) Using Gauss Backward difference polynomial, find  $y(5)$  given that

X	0	4	6	8	10
Y	5	11	13	15	17

[8+8]

- 3.(a) Using Newton-Raphson method, find a positive root of  $\cos x - x e^x = 0$  up to four decimal places.
- (b) Using Lagrange's Interpolation, find  $f(12)$ , given that

X	3	7	9	13
Y	5	12	13	21

[8+8]

5.(a) Represent the function as Fourier sine series  $f(x) = \begin{cases} \frac{\pi}{2}, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$ .

(b) Estimate  $y(0.2)$ , given  $y' = 3x + y, y(0) = 1$  using Runge-Kutta 4<sup>th</sup> order.

[8+8]

6.(a) Find Fourier cosine transform of  $\frac{e^{-ax}}{x}$ .

(b) Find the Z-transform of  $\{x(n)\} = n z^n$

[8+8]

7.(a) Find Fourier transform of  $f(x) = \begin{cases} \frac{1}{2a}, & |x| \leq a \\ 0, & |x| > a \end{cases}$ .

(b) Solve  $u_{n+2} - u_n = 2^n, u_0 = 0, u_1 = 1$  using Z-transform.

[8+8]

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**I B. Tech II Semester Regular Examinations August - 2014**  
**PROFESSIONAL ETHICS & HUMAN VALUES**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

**Time: 3 hours**

**Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

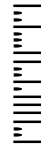
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**PART-A**

1. (i) Explain the meaning of accountability.  
(ii) What are values? Explain how values have degenerated.  
(iii) Explain the meaning of moral leader ship.  
(iv) Discuss the aim of engineering ethics.  
(v) Discuss the need to focus on professional ethics.  
(vi) Write a short note on industrial standards.  
(vii) Write about 'employee rights' [3+3+3+3+3+3+4]

**PART-B**

2. Discuss the relationship between professional responsibility and loyalty to company? [16]
3. What are the aspects of engineering that make it appropriate to view engineering projects as experiments? [16]
4. Write briefly on  
(a) honesty  
(b) living peace fully  
(c) civic virtue  
(d) integrity. [4+4+4+4]
5. What is Indian scenario in accordance with 'Intellectual Property Rights, IPR'? [16]
6. Write short notes on  
(a) Types of inquiry  
(b) HEINZ's Dilemma [8+8]
7. Write about safety and engineer and risk benefit analysis. [16]





Subject Code: R13208/R13

Set No - 2

**I B. Tech II Semester Regular Examinations August - 2014**  
**PROFESSIONAL ETHICS & HUMAN VALUES**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

**Time: 3 hours**

**Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

1. (i) What are threshold levels for risk?
- (ii) Write about human values.
- (iii) Give an account of History of Ethics.
- (iv) What is contextualism?
- (v) What are the limitations of code of ethics?
- (vi) What is meant by loyalty and collegiality?
- (vii) What are the responsibilities of engineers to society?

[3+3+3+3+3+3+4]

**PART-B**

2. Explain in detail about the effect of information on risk assessments.

[16]

3. Define and explain personal ethics and professional ethics.

[16]

4. What do you understand by environmental ethics?

[16]

5. Write a short note on

- (a) Industrial standards
- (b) Regulated society.

[8+8]

6. Explain the levels of moral development suggested by Kohlberg.

[16]

7. 'Professional rights can lead to conflicts of interest'. Explain.

[16]

Subject Code: R13208/R13

Set No - 3

**I B. Tech II Semester Regular Examinations August - 2014**

**PROFESSIONAL ETHICS & HUMAN VALUES**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

**Time: 3 hours**

**Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

1. (i) What are the three senses of relative values?
- (ii) How courage is considered to be a virtue?
- (iii) What are the uses of ethical theories?
- (iv) Write short notes on concept of safety.
- (v) What is Integrity?
- (vi) What do you understand by experimental control?
- (vii) What are the responsibilities of engineers to society?

[3+3+3+3+3+3+4]

**PART-B**

2. Explain in detail the effect of information on risk assessments.

- (a) Designing for Safety.
- (b) Types of Risks.

[8+8]

3. Explain in detail

- (a) Peace
- (b) Non violence
- (c) Right conduct
- (d) Respect for others

[4+4+4+4]

4. Write about the standards to be maintained by an Engineer in order to make a successful project, within the limitations of norms and ethics.

[16]

5. (a) What conclusions were made by Gilligan about men and women?
- (b) Bring out the differences between profession and professionalism.

[8+8]

Subject Code: R13208/R13

Set No - 4

I B. Tech II Semester Regular Examinations August - 2014

**PROFESSIONAL ETHICS & HUMAN VALUES**

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E)

Time: 3 hours

Max. Marks: 70

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

1. (i) Write a brief account on 'utilitarianism'.
- (ii) 'Conscientiousness is blind without relevant information'. Justify.
- (iii) How courage is considered as virtue?
- (iv) What is meant by globalization?
- (v) Explain types of inquiry.
- (vi) What degree of risk is acceptable in an experiment to make a new product?
- (vii) Discuss in detail about the employee rights.

[3+3+3+3+3+3+4]

**PART-B**

2. Explain in detail about the Intellectual Property Rights. . [16]
3. Analyze the attitude of different types of consumers with regard to safety. Discuss [16]
4. Write about [8+8]
  - (a) Kohlberg's theory
  - (b) Professional Ethics.
5. Explain the relationship between professional responsibility and loyalty to company. [16]
6. What are the general features of morally responsible engineers? Explain each feature with appropriate examples. [16]
7. (a) How character is formed?  
(b) Explain the essence of Indian spirituality. [8+8]

[8+8]