



DADI INSTITUTE OF ENGINEERING & TECHNOLOGY

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I B.TECH Question Bank

Subject : Mathematics-III Branch: EEE, CIVIL.

Faculty: Prof.Dr.Ch.Prabhakara Rao.

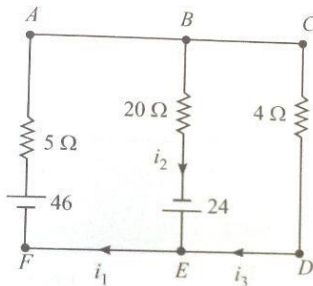
UNIT -I

1(a) Find the rank of the matrix by reducing the matrix $A = \begin{bmatrix} 2 & 1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \end{bmatrix}$ to canonical form .

(b) prove that the following set of equations are consistent and solve them.

$$2x - y - z = 2 ; x + 2y + z = 2 ; 4x - 7y - 5z = 2 ;$$

2(a) Find the currents in the following circuits



(b) solve the system of equations $10x + y + z = 12$, $2x + 10y + z = 13$ and $2x + 2y + 10z = 14$ using Gauss-seidel method.

3(a) Find the non singular matrices P and Q such that the normal form of A is PAQ where

$$A = \begin{bmatrix} 1 & 3 & 6 & -1 \\ 1 & 4 & 5 & 1 \\ 1 & 5 & 4 & 3 \end{bmatrix}. \text{ Hence find its rank.} \quad 5M$$

(b) Find the rank of $\begin{pmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{pmatrix}$ after reducing it to Echelon form

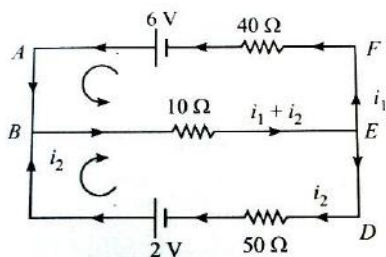
5(a) Solve the system of equations $20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = 25$ by Gauss Jacobi method

(b) Reduce the matrix A to normal form and hence find the rank of the matrix

$$A = \begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 1 & 2 \end{bmatrix}$$

6(a) Solve the equations $3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4$ using Gauss elimination method.

(b) Find the currents in the following circuits



UNIT – II:

1(a) Find Eigen values and Eigen vectors of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ 5M

(b) Reduce the quadratic form $10x^2 + 2y^2 + 5z^2 - 4xy - 10xz + 6yz$ into canonical form and find the nature, rank, index and signature. 5M

2(a) Reduce the Quadratic form $3x_1^2 + 3x_2^2 + 3x_3^2 + 2x_1x_2 + 2x_1x_3 - 2x_2x_3$ into sum of squares form by an orthogonal transformation and give the matrix transformation.

(b) Find A^{-1} using Cayley –Hamilton theorem, where $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$ 6M

3(a) what is the nature of the quadratic form X^TAX , if $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ 4M

(b) Prove that if τ is an Eigen value of a matrix A then τ^{-1} is an Eigen value of matrix A^{-1} if it exists.

4(a) If τ is an Eigen value of a non singular matrix A then show that $\frac{|A|}{\tau}$ is an Eigen value of matrix adjoint A(adjA)

(b) Find A^{-1} using Cayley-Hamilton theorem, where $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ 6M

5(a) state Cayley-Hamilton theorem and find A^8 if $A = \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix}$

(b) Diagonalize the matrix $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ -1 & 2 & 2 \end{bmatrix}$ 6M

6(a) Show that if λ is an eigen value of A, then prove that the eigen value of

$B = a_0A^2 + a_1A + a_2I$ is $a_0\lambda^2 + a_1\lambda + a_2$. 4M

(b) Is the matrix $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 2 & 5 & 7 \end{bmatrix}$ diagonalizable? 6M

UNIT -III :

1(a) Find surface area of the right circular cone generated by the revolution of right angled triangle about a side which contains a right angle. 4M

(b) Evaluate $\int_0^1 \int_{x^2}^{2-x} xy dx dy$ by changing the order of integration. 6M

2(a) Find the volume of the solid generated by revolving the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ ($0 < b < a$) about the major axis. 5M

(b) By changing the order of integration, evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 dx dy$ 5M

3(a) Find the moment of inertia about the initial line of the cardioid $r = a(1 - \cos\theta)$. 5M

(b) Find the surface area generated by the revolution of an arc of the catenary $y = c \cosh \frac{x}{c}$ about x-axis. 5M

4(a) Find the length of the curve $3x^2 = y^3$ between $y = 0$ and $y = 1$. 5M

(b) Find the volume obtained by revolving the loop of the curve $x = t^3, y = t - \frac{t^3}{3}$ about x-axis. 5M

5(a) Trace the curve $r = a + b \cos\theta$, $a > b$. 4M

(b) Find the length of the arc of the parabola $y^2 = 4ax$ measured from the vertex to both extremities of the latus-rectum. 6M

6(a) Evaluate $\int_0^a \int_x^a (x^2 + y^2) dy dx$ by changing the order of integration. 5M

(b) Evaluate $\iint (x^2 + y^2) dx dy$ in the positive quadrant for which $x + y \leq 1$. 5M

UNIT – IV:

- 1(a) Show that $\int_0^\infty \sqrt{x}e^{-x^3} dx = \frac{\sqrt{\pi}}{3}$ 4M
- (b) Show that $\int_0^\infty x^m e^{-ax^n} dx = \frac{1}{na} \frac{\Gamma(\frac{m+1}{n})}{n}$ where m and n are positive constants. 6M
- 2(a) Prove that $\Gamma\Gamma(n)\Gamma\Gamma(n-1) = \frac{\pi}{\sin n\pi}$ 4M
- (b) Express $\int_0^1 x^m (1-x^n)^p$ in terms of Γ function. 6M
- 3(a) Evaluate $\int_0^1 \frac{dx}{(1-x^3)^{1/3}}$ using Beta functions. 4M
- (b) Evaluate $\int_5^7 (x-5)^6 (7-x)^3 dx$ using β and $\Gamma\Gamma$ functions. 6M
- 4(a) Show that $\Gamma(\frac{1}{2}) = \sqrt{\pi}$ 4M
- (b) Show that $B(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$ where $m > 0, n > 0$. 6M
- 5(a) Evaluate $\int_0^{\pi/2} \sin^5 \theta \cos^{7/2} \theta d\theta$. 4M
- (b) Evaluate $\int_0^1 x^4 \left(\log \frac{1}{x}\right)^3 dx$ 6M
- 6(a) Evaluate $\int_0^1 \frac{xdx}{\sqrt{1-x^2}}$. 4M
- (b) Evaluate $\int_0^\infty x^2 e^{-x^2} dx$. 6M

UNIT- V :

- 1(a) If ϕ satisfies Laplace equation, show that $\nabla\phi$ is both Solenoidal and irrotational. 4M
- (b) Prove that $div.(gradr^m) = m(m+1)r^{m-2}$ 6M
- 2(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). 4M
- (b) If \vec{A} is irrotational, evaluate $div(\vec{A} \times \vec{r})$ where $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ 6M
- 3(a) Find $div\vec{F}$, where $\vec{F} = r^n \vec{r}$. Find n if it is solenoidal. 4M
- (b) Find a, b, c so that $\vec{A} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + y + 2z)\vec{k}$ is irrotational. also find ϕ such that $\vec{A} = \nabla\phi$ 6M
- 4(a) In what direction from the point (-1, 1, 2) is the directional derivative of $\phi = xy^2z^3$ a maximum. What is the magnitude of this maximum? 4M

(b) Show that the vector $(x^2 - yz)\bar{i} + (y^2 - zx)\bar{j} + (z^2 - xy)\bar{k}$ is irrotational and find its scalar potential. 6M

5(a) Find the directional derivative of $\frac{1}{r}$ in the direction of $\bar{r} = xi + yj + zk$ at $(1, 1, 2)$ 4M

(b) Prove that $div(\bar{a} \times \bar{b}) = \bar{b} \cdot curl\bar{a} - \bar{a} \cdot curl\bar{b}$ 6M

6(a) Find the directional derivative of the function $\phi = xy^2 + yz^3$ at $(2, -1, 1)$ in the direction of normal to the surface $x \log z - y^2 = 4 = 0$ at $(-1, 2, 1)$ 4M

(b) Show that $\frac{\bar{r}}{r^3}$ is solenoidal, where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$ 6M

UNIT – VI:

1(a) Use Greens theorem to evaluate $\int (2xy - x^2)dx + (x^2 + y^2)dy$, where c is the closed curve of the region bounded by $y = x^2$ and $y^2 = x$. 4M

(b) Use divergence theorem to evaluate $\iint \bar{F} \cdot d\bar{s}$ where $\bar{F} = 4x\bar{i} - 2y^2\bar{j} + z^2\bar{k}$ and S is the surface bounded by the region $x^2 + y^2 = 4, z = 0$ and $z = 3$. 6M

2(a) Evaluate $\int (e^x dx + 2ydy - dz)$ where c is the curve is the curve is the curve $x^2 + y^2 = 9, z = 2$, by using Stoke's theorem. 5M

(b) Compute $\int (ax^2 + by^2 + cz^2)d\bar{s}$ over the surface of the sphere $x^2 + y^2 + z^2 = 1$. 5M

3(a) If $\bar{F} = (5xy - 6x^2)\bar{i} + (2y - 4x)\bar{j}$, evaluate $\int \bar{F} \cdot d\bar{r}$ along the curve c in xy plane : $y = x^3$ from $(1, 1)$ to $(2, 8)$. 4M

(b) Apply stoke's theorem to evaluate $\int (ydx + zdy + xdz)$ where c is the curve of intersection of the sphere $x^2 + y^2 + z^2 = a^2$ and $x + z = a$. 6M

4(a) Using stoke's theorem, evaluate the integral $\int \bar{F} d\bar{r}$, where $\bar{F} = 2y^2\bar{i} + 3x^2\bar{j} - (2x + z)\bar{k}$ and c is the boundary of the triangle whose vertices are $(0,0,0), (2,0,0)$ and $(2,2,0)$. 4M

(b) Using divergence theorem to evaluate $\iint \bar{F} \cdot d\bar{s}$ where $\bar{F} = x^3\bar{i} + y^3\bar{j} + z^3\bar{k}$ and S is surface of the sphere $x^2 + y^2 + z^2 = r^2$. 6M

5(a) If $\bar{F} = (2x^2 - 3z)\bar{i} - 2xy\bar{j} - 4x\bar{k}$ then evaluate $\iiint \nabla \cdot \bar{F} dv$ where v is the closed region bounded by $x=0, y=0, z=0$ and $2x+2y+z=4$. 5M

(b) Evaluate by Green's theorem $\oint (y - \sin x)dx + \cos x dy$ where C is the triangle enclosed by the lines $y = 0, x = \frac{\pi}{2}, \pi y = 2x$. 5M

6(a) If $\bar{F} = xy\bar{i} - z\bar{j} + x^2\bar{k}$ and C is the curve $x = t^2, y = 2t$ and $z = t^3$ from $t = 0$ to $t = 1$, find the workdone by \bar{F} . 4M

(b) Compute the line Intergral $\int (y^2 dx - x^2 dy)$ round the triangle whose vertices are $(1,0), (0,1)$ and $(-1,0)$. 6M



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I B.Tech (Sem-II) QUESTION BANK

Branch : EEE/CIVIL Faculty : P.lakshmi narayana

Sub: ENGINEERING DRAWING

UNIT-1

- 1.(a) construct a plain scale of RF 1:50000 TO show kilometers and hectometers and long enough to measure upto 7 kilometers. Measure a distance of 54 hectometers on your scale(7 M)
- (b) Draw an Octagon given the length of side 25mm (4M)
- 2.(a) construct a plain scale to show meters when 1 cm represents 4 meters and long enough to measure upto 50 meters . find the R.F and mark on your scale a distance of 36 meters(7M)
- (b) Construct a regular polygon of any number of sides, given the length of its sides equal to 25mm. (4M)
- 3.(a) The foci of an ellipse are 90mm apart and the minor axis is 72mm long. Determine the length of the major axis. Construct the ellipse. Draw a tangent to the ellipse from any point.(16M)
- (b) Construct a regular hexagon of side 28mm when one side is horizontal. (4M)
4. The major axis of an ellipse is 150mm long and the minor axis is 100mm long. Find the foci and draw the ellipse by arcs of circles method. Draw a tangent to the ellipse at a point on it 25mm above the major axis.(16M)
5. (a) Construct a DIAGONAL scale of RF 1:320000 TO show kilometers and long enough to measure upto 400 km show distance of 257 KM AND 333 KM on your scale.(7M)
- (b) The foci of an ellipse are 90 mm apart and the minor axis is 72 mm long. Determine the length of the major axis. Construct the ellipse. (7M)
6. (a) Construct an ellipse when the major axis is 120 mm and the distance between the foci is 108 mm. Determine the length of the minor axis. (7M)
- (b) CONSTRUCT A vernier scale to read meters , decimeters and centimeters and long enough to measure upto 4 mt . RF of the scale is 1/20 MARK on your scale a distance of 2.28 mt(7M)

UNIT-II

- 1.(a) Draw the orthographic projections of the following points:
 - (i) A, 20mm above HP and 30mm behind VP
 - (ii) B, 25mm below HP and 25mm in front of VP
 - (iii) C, 25mm below HP and 30mm behind VP
 - (iv) D, 30mm below HP and in VP (7M)

- (b) The top view of a 75mm long line measures 55mm. The line is in the VP; its one end being 25mm above the HP. Draw its projections. (7M)
2. (a) A line MN 50mm long is parallel to VP and inclined at 30° to HP. The end M is 20mm above HP and 10mm in front of VP. Draw the projections of the line.(7M)
- (b) A point P is 20mm below HP and lies in the third quadrant. Its shortest distance from xy is 40mm. Draw its projections. (7M)
3. A line AB 50mm long is perpendicular to VP and parallel to HP. Its end A is 20mm in front of VP and the line is 40mm above HP. Draw the projections of the line.(16M)
- (i) A, 25mm above H.P and 35mm in front of V.P
- (ii) B, 25mm above H.P and 40 mm behind V.P
4. (a) The front view of a line inclined at 30° to the V.P is 65 mm long. Draw the projections of the line, when it is parallel to and 40 mm above the H.P, its one end being 30 mm in front of the V.P.(8M)
- (b) Mark the projections of the following points on a common reference line,(8M)
- (i) C, 30mm below H.P and 45 mm behind V.P
- (ii) D, 30 mm below H.P and 40 mm in front V.P
5. Two pegs fixed on a wall are 4.5 metres apart. The distance between the pegs measured parallel to the floor is 3.6 metres. If one peg is 1.5 m above the floor, find the height of the second peg and the inclination of the line joining the two pegs with the floor. (16M)
- 6.
- (a) A line PQ 40 mm long is parallel to VP and inclined at an angle of 30° to HP. The lower end P is 15 mm above HP and 20 mm in front of VP. Draw the projections of the line.(8M)
- (b) Draw the projections of a line EF 40 mm long parallel to HP and inclined at 35° to VP. E is 20 mm above HP and 15 mm in front of VP.(8M)

UNIT-III

1. ⁺ The top view of a 75mm long line AB measures 65 mm, while the length of its front view is 50mm ITS one end A is in the HP AND 12 mm in front of the vp. draw the projections of AB and determine the inclinations with the HP AND the VP(16M)
2. A line CD measuring 80 mm is inclined at an angle of 30° to HP and 45° TO VP. the point C is 20 mm above HP and 30mm in front of VP. Draw the projections of the straight line(16M)
3. A line AB is 75mm long. A is 50 mm in front of VP and 15 mm above HP. B is 15mm in front of vp and is above HP. TOP VIEW OF AB is 50 mm long. Find the front view length and the true inclinations(16M)
4. A line AB 65 mm long has its end A 20 mm above HP AND 25mm in front of VP. END B is 40 mm above HP and 65mm in front of VP. Draw the projections of AB. find its inclinations with HP and VP(16M)
5. THE PROJECTIONS OF A line measure 80mm in the top view and 70mm in the front view. The MID-POINT of the line is 45mm in front of vp and 35mm above HP. ONE END IS 10 mm in front of VP and nearer to it. Draw the projections. find the true length and true inclinations with reference planes(16M)
6. A line AB 65 MM LONG HAS ITS END A .15 mm above HP AND 15MM IN FRONT OF VP. IT IS INCLINED AT 55° to HP and 35° to VP draw its projections(16M)

UNIT-IV

1. A regular pentagonal plate of side 28mm is placed with one side on HP such that the surface is inclined at 45° to HP and perpendicular to VP. draw its projections and traces(16M)
2. A thin circular metal plate of 48 mm diameter, having its plane vertical and inclined at 40° to VP

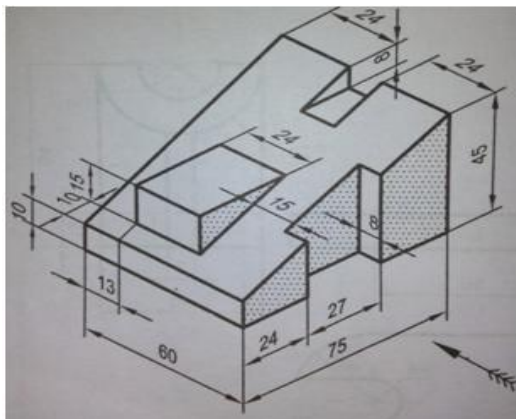
- Its center is 33mm above HP and 25mm in front of VP. DRAW ITS projections and locate its traces(16M)
- 3 A thin rectangular plate of sides 50mm x 25mm has its shorter side in the HP and inclined at an angle of 30° to the VP. PROJECT ITS FRONT VIEW WHEN ITS TOP view is a perfect square of 25mm side(16M)
 - 4 A regular pentagonal lamina of 30mm sides has one edge in HP and inclined at an angle of 30° to VP DRAW ITS PROJECTIONS WHEN its surface is inclined at 45° to HP(16M)
 - 5 Draw the projections of the circle of 50 mm diameter resting in the H.P on a point A on the circumference, its plane inclined at 45° to the H.P and
 - (a) The top view of the diameter AB making 30° angle with the V.P(8M)
 - (b) The diameter AB making 30° angle with the V.P(8M)
 6. A circular lamina of 60mm diameter rests on Hp on a point 1 on the circumference. The lamina is inclined to HP such that the top view of it is an ellipse of minor axis 35mm. The top view of the diameter through the point 1 makes an angle of 45° with VP.(8M+8M)
 - i) Draw the projections
 - ii) Determine the angle made by the lamina with HP.

UNIT-V(ALL QUESTIONS CARRY 16M)

1. Draw the projections of a cylinder, base 30mm diameter and axis 40mm long resting with a point of its base circle on HP such that the axis is making an angle of 30° with HP and parallel to VP.
2. A pentagonal prism side of base 25mm and axis 50mm long resting with one of its edges on HP such that the base containing that edge makes an angle of 30° to HP and its axis is parallel to VP. Draw its projections.
3. Draw the projections of a cylinder 75mm diameter and 100 mm long, lying on the ground with its axis inclined at 30° to the V.P and parallel to the ground.
4. Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the H.P on one of its generators with the axis parallel to the V.P.
5. Draw the projections of a cone of base 30mm diameter and axis 50mm long resting on HP on a point of its base circle with the axis making an angle of 45° with HP and parallel to VP.
6. A cone 40mm base and axis 50mm long touches VP on a point of its base circle. The axis is inclined at 30° to VP and the front view of the axis is inclined at 45° to HP. Draw its projections?.

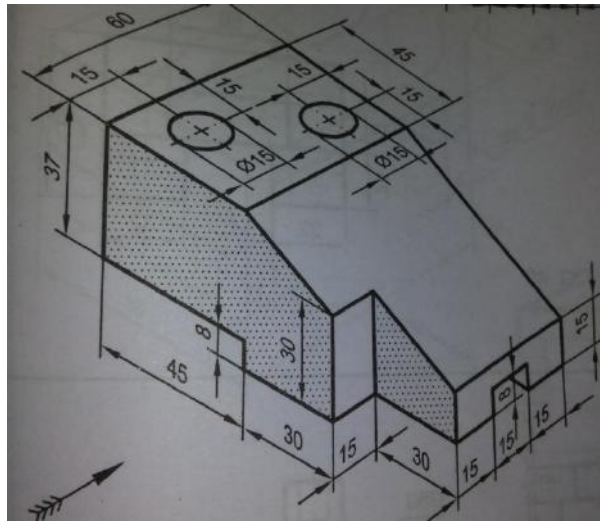
UNIT-VI(ALL QUESTIONS CARRY 16M)

1. Draw the orthographic view as shown in fig

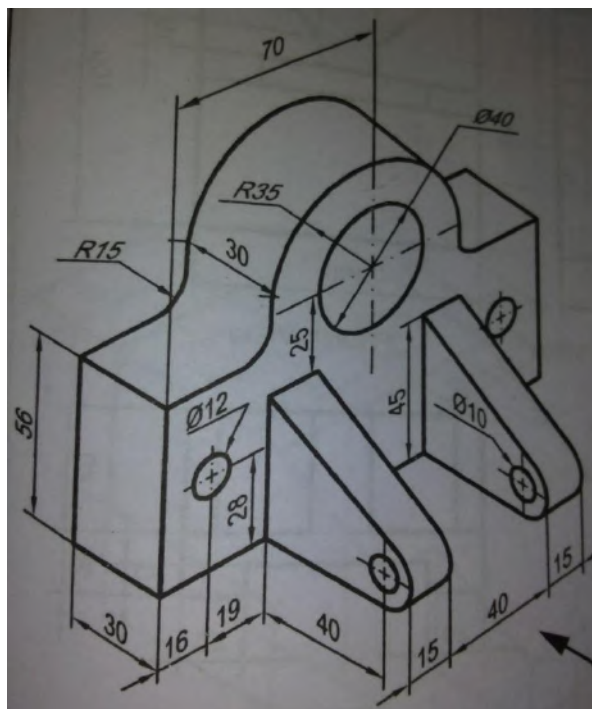


ALL DIMENSIONS ARE IN MM

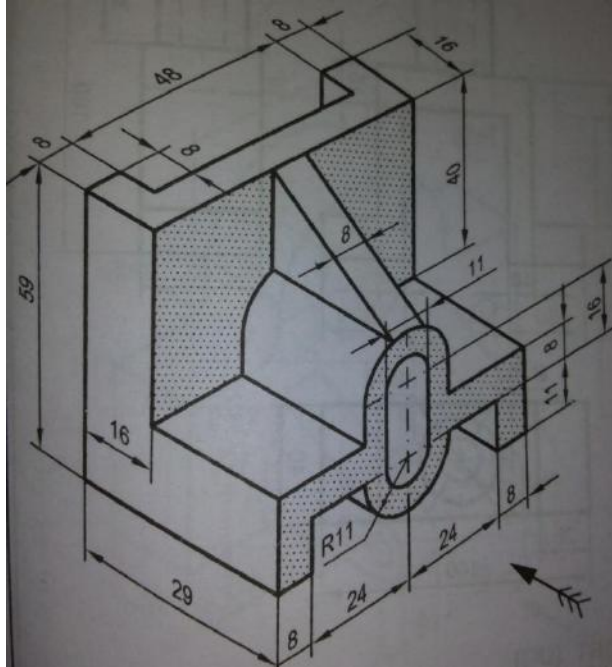
2 Draw the orthographic view as shown in fig



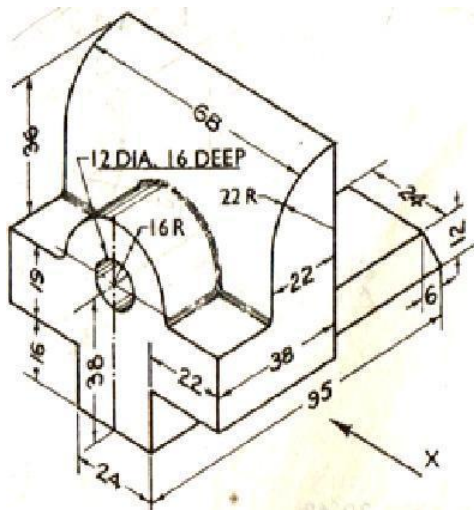
3 Draw the orthographic view as shown in fig



4 Draw the orthographic view as shown in fig

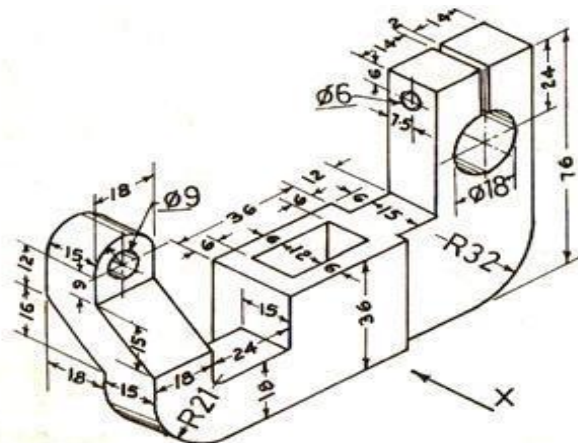


2. Draw (i) Front View (ii) Side View (iii) Top View as shown in fig



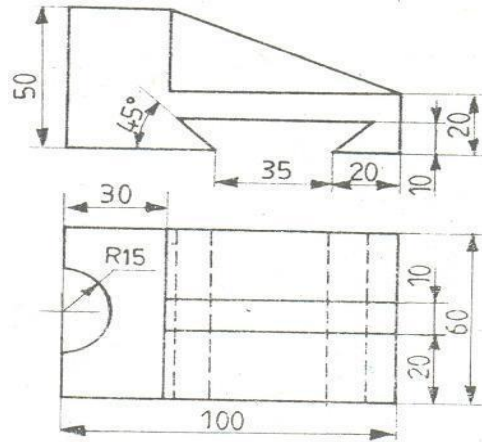
(Note: all dimensions are in mm)

3. Draw (i) Front View (ii) Top View (iii) Side View as shown in fig



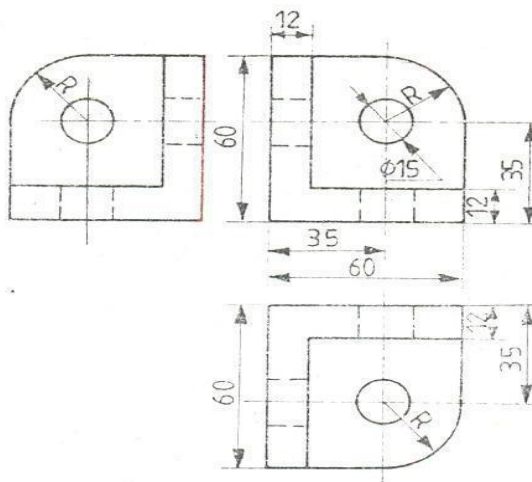
(Note: all dimensions are in mm)

4. Draw the isometric view as shown in fig



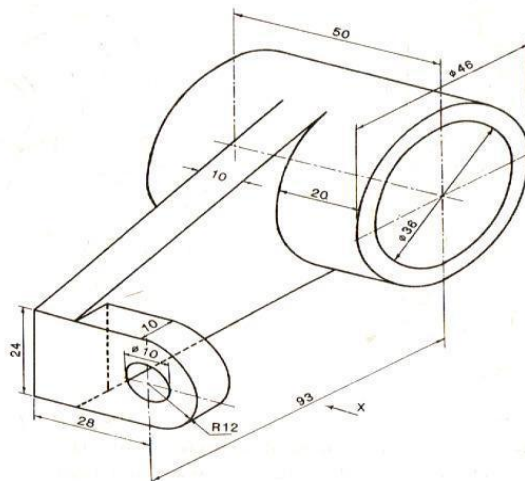
(Note: all dimensions are in mm)

5. Draw the isometric view as shown in fig



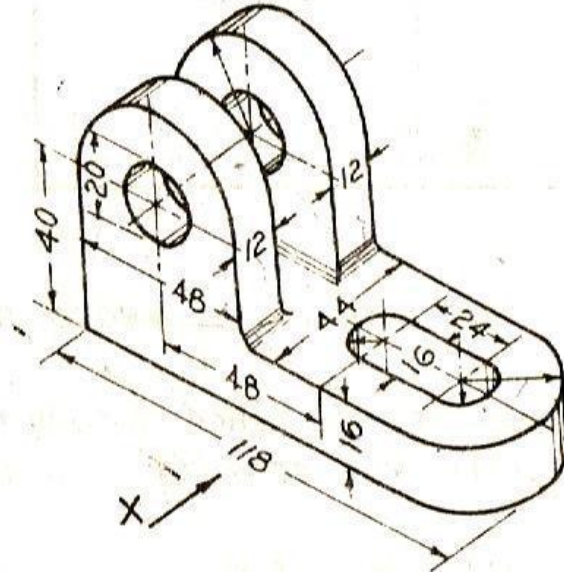
(Note: all dimensions are in mm)

6. Draw (i) Front View (ii) Top View (iii) Side View, as shown in fig.



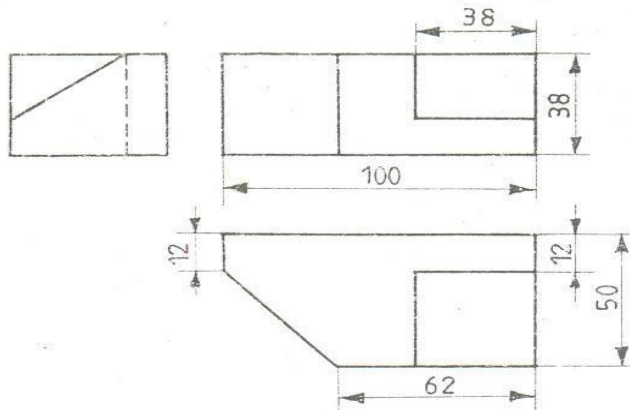
(Note: all dimensions are in mm)

7. Draw (i) Front View (ii) Side View from the right (iii) Top View as shown in fig



(Note: all dimensions are in mm)

8. Draw the isometric view as shown in fig.



(Note: all dimensions are in mm)



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DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

ACADEMIC YEAR: 2017-18

CLASS: I B.Tech CIVIL

FACULTY NAME: K.PADMAJA

SEMESTER: II

SUBJECT: ELEMENTS OF MECHANICAL ENGINEERING

Course Weight age:

Internal Marks: 30

External Marks: 70

UNIT-I

1. Derive the relation between

- (a) Modulus of elasticity (E) and modulus of rigidity (G)
- (b) Modulus of elasticity (E) and bulk modulus (K)
- (c) Hence show that $E = 9KN / (3K+G)$.

[10]

2. a) Define (i) Poisson's ratio and (ii) Volumetric strain [3]

ii. The Modulus of rigidity for a material is $0.51 \times 10^5 \text{ N/mm}^2$. A 10 mm diameter rod of the Material was subjected to an axial pull of 10 kN and the change in diameter was observed to be $3 \times 10^{-3} \text{ mm}$. Calculate Poisson's ratio and the modulus of elasticity.[7]

3. Derive the expressions for total extension for tapered rectangular and circular cross-sectional rods subjected to tensile load P. [10]

4. A straight bar 60 cm long consists of three portions : the first 18 cm length is of 30 mm dia, the middle 26 cm length is of 20 mm dia. and the remaining 16 cm length is of 25 cm dia. if it is subjected to an axial pull of 100 kN find the total extension of the bar. Find also the stresses, strains and changes in length of different portions. Take $E = 200 \text{ GPa}$ [10]

5. A rectangular plate made of steel is 4 m long and 20 mm thick and is subjected to an axial Tensile load of 40 kN. The width of the plate varies from 30 mm at one end to 80 mm at the Other end. Find the elongation, if $E = 2 \times 10^5 \text{ N/mm}^2$. [10]

6. A steel tube 2.4 cm external diameter and 1.8 cm internal diameter encloses a copper rod 1.5cm diameter to which it is rigidly joined at each end. If at a temperature of 100°C there is no

longitudinal stresses ,calculate the stresses in the rod and the tube when the temperature is raised to 200°C . $E_s=210 \text{ kN/mm}^2$ and $E_c=1000 \text{ kN/mm}^2$. Coefficient of linear expansion for steel is $11 \times 10^{-6} /^{\circ}\text{C}$ and for copper $18 \times 10^{-6} /^{\circ}\text{C}$ [16]

UNIT-II

- 1(a).Describe the different kinds of beams and their end reactions [3]
(b) Define point of contra flexure, Shear force and bending moment [4]
(c)Draw the B.M diagram of a cantilever beam of span L, subjected to a couple M at the free end. [3]
(d)What is the convention for shear force and bending moment? Show with the help of Diagrams [4]
2. A simply supported beam of length 10m carries point loads of 4kN, 10kN and 7kN at a distance of 1.5m, 2.5m and 3m respectively from left end A. Draw the S.F. and B.M. diagrams for the simply supported beam[10]
3. A simply supported beam of span 9 m loaded with a varying load of intensity zero at the left hand side and 3 kN/m at the right side. Draw the S.F and B.M diagrams. [12]
4. A simply supported beam of length 10m carries point loads of 4kN, 10kN and 7kN at a distance of 1.5m, 2.5m and 3m respectively from left end A. Draw the S.F. and B.M. diagrams for the simply supported beam[10]
5. (a) Derive an expression for bending stress at a layer in a beam. [10]
(b)Derive the bending equation from fundamentals $M/I = f/y = E/R$
- 6.(a)Obtain the expression for shearing stress at a section of a loaded beam [4]
(b)Show that the ratio of maximum shear stress to average shear stress is 1.5 in case of a rectangular section (bxd). [6]

UNIT-III

- 1.(a)Deduce the longitudinal stress for a thin spherical shell subjected to an internal pressure of intensity 'p', with a thickness 't' and diameter 'd'. [4]
(b)Discuss the necessity and mechanics of compound cylinders [4]
(c) Derive the relation for volumetric strain and volume change for a thick spherical shell [4]
2. Derive an expression for circumferential stress and longitudinal stress for a thin shell subjected to an internal pressure. [10]
3. A compound cylinder, formed by shrinking one tube on to another, is subjected to an internal pressure of 80 N/mm^2 . Before the fluid is admitted the internal and external diameters of the compound cylinder are 120mm and 200 mm and the diameter at the junction is 160mm. If, after shrinking on, the radial pressure at the common surface is 10 N/mm^2 , calculate the final stress set up by the section. [10]

4. A cylindrical shell 3 m long has 1 m internal diameter and 15 mm metal thickness. Calculate the circumferential and longitudinal stresses induced and also changes in the dimensions of the shell, if it is subjected to an internal pressure of 1.5 N/mm^2 . Take $E = 200 \text{ kN/mm}^2$ and Poisson's ratio = 0. [10]
5. A steel cylinder (thick) of 300 mm external diameter is to be shrunk to another steel cylinder of 150 mm internal diameter. After shrinking the diameter at the junction is 250 mm and radial pressure at the common junction is 28 N/mm^2 . Find the original difference in radii at the junction. Take $E = 2 \times 10^5 \text{ N/mm}^2$. [10]
6. Derive the Lames equations from the fundamentals in a thick cylindrical shell for the given radii (r_1 and r_2) and internal fluid pressure, p . [10]
7. A cylindrical drum 400 mm in diameter has a thickness of 8mm. If the drum is subjected to an internal pressure of 2 N/mm^2 , determine the increase in the volume of the drum. Take young's modulus of elasticity, $E = 1.6 \times 10^5 \text{ N/mm}^2$ and poisson's ratio 0.25.
8. A thick spherical shell of 350mm inside diameter is subjected to an internal pressure is 2 N/mm^2 . Determine the necessary thickness of the shell, if the permissible stress in the shell material is 2.8 N/mm^2
9. A pipe of 300 mm internal diameter and 60 mm thickness carries a fluid at a pressure of 15 MN/m^2 . Calculate the maximum and minimum intensities of circumferential stresses across the section. Also sketch the radial stress distribution and circumferential stress distribution across the section.

UNIT-IV

1. a) Define Steam Boiler and Classify Different types of boilers
b) Write the essentialities of boiler
2. a) explain selection of different types of boilers
b) Explain about boiler mountings and boiler accessories
3. Explain the working principle of any one Water tube boiler with neat sketch.
4. Explain the working principle of any one Fire tube boiler with neat sketch.
5. a) Explain any two boiler mountings with neat sketch
b) Explain any two boiler accessories with neat sketch.
6. What is a steam turbine .Classify different type of steam turbines?
7. a).Classify and explain different types of Compressors

- b) Write the uses of compressed air
8. Explain the working principle of reciprocating compressor with neat sketch
9. What is the work done in single stage and two stage compression?

UNIT-V

1. Explain working principle of 4 stroke petrol engine with neat sketch?
2. Explain working principle of 4 stroke Diesel engine with neat sketch?
3. Explain working principle of 2 stroke petrol engine with neat sketch?
4. Explain working principle of 2 stroke Diesel engine with neat sketch?
5. a) Compare two stroke engines with four stroke engines?
b) Compare Compression ignition engine with Spark ignition engine?
6. a) What is an I.C engine? Classify different types of engines
b) Explain the basic engine components and nomenclature?

UNIT-IV

1. Explain in detail about belt and rope drives with neat sketches.
2. Describe the following a) velocity ratio b) slip c) length of the belt d) ratio of friction tensions
3. An engine, running at 150 r.p.m., drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft being 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft, when a) there is no slip, and b) **there** is a slip of 2% at each drive.
4. The power is transmitted from a pulley 1 m diameter running at 200 r.p.m. to a pulley 2.25 m diameter by means of a belt. Find the speed lost by the driven pulley as a result of creep, if the stress on the tight and slack side of the belt is 1.4 MPa and 0.5 MPa respectively. The Young's modulus for the material of the belt is 100 MPa.
5. A shaft which rotates at a constant speed of 160 r.p.m. is connected by belting to a parallel shaft 720 mm apart, which has to run at 60, 80 and 100 r.p.m. The smallest pulley on the driving shaft is 40 mm in radius. Determine the remaining radii of the two stepped pulleys for 1. a crossed belt, and 2. an open belt. Neglect belt thickness and slip.
6. Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25?
7. A shaft rotating at 200 r.p.m. drives another shaft at 300 r.p.m. and transmits 6 kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley

is 0.5 m in diameter. Calculate the stress in the belt, if it is **1**. An open belt drive, and **2**. Cross belt drive. Take $\mu = 0.3$.

8. a) Explain different types gears
b) Explain about law of gearing
9. a) Explain different types of gear profiles
b) Write the applications of the gear
10. a) Explain different types gear trains with neat sketch
b) Two parallel shafts, about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 r.p.m. and the other at 120 r.p.m. Design the gears, if the circular pitch is to be 25 mm.
11. The speed ratio of the reverted gear train, as shown in Fig. 13.5, is to be 12. The module pitch of gears A and B is 3.125 mm and of gears C and D is 2.5 mm. Calculate the suitable numbers of teeth for the gears. No gear is to have less than 24 teeth
12. A compound train consists of six gears. The number of teeth on the gears are as follows:
Gear: A B C D E F No. of teeth: 60 40 50 25 30 24
The gears B and C are on one shaft while the gears D and E are on another shaft. The gear A drives gear B, gear C drives gear D and gear E drives gear F. If the gear A transmits 1.5 kW at 100 r.p.m. and the gear train has an efficiency of 80 per cent, find the torque on gear F.



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DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

ACADEMIC YEAR: **2016-17**

CLASS: **I B.Tech CIVIL**

FACULTY NAME: **ROHINIKUMAR CH**

SEMESTER: **II**

SUBJECT: **ELEMENTS OF MECHANICAL ENGINEERING**

Course Weight age:

Internal Marks: 30

External Marks: 70

UNIT-I

- 1.a) Define Steam Boiler and Classify Different types of boilers
- b) write the essentialities of boiler
- 2.a) explain selection of different types of boilers
- b) explain about boiler mountings and boiler accessories
3. Explain the working principle of any one Water tube boiler with neat sketch.
4. Explain the working principle of any one Fire tube boiler with neat sketch.
- 5.a) Explain any two boiler mountings with neat sketch
- b) Explain any two boiler accessories with neat sketch.
6. What is a steam turbine .classify different types of steam turbine

UNIT-II

- 1.a) Define welding and classify different types of welding process
- b) Explain about arc welding process with neat sketch
- 2.a) Explain about gas welding process with neat sketch
- b) Explain about resistance welding with neat sketch
3. Write short notes on following: a) Soldering b) Brazing
- 4.a) What is Forging , Explain different forging operations.
- b) Explain the principles of hot rolling and hot extrusion
- 5.a) Explain the steps involved in making a casting mold
- b) Write the application and advantages of casting
- 6.a) Explain different types of patterns
- b) Classify different types of Lathes and write the specifications of a Lathe

UNIT-III

- 1a).Classify and explain different types of Compressors
- b)write the uses of compressed air
2. Explain the working principle of reciprocating compressor with neat sketch
3. Explain the working principle of rotating compressor with neat sketch
- 4.a)what is refrigeration and explain the principle of refrigeration
- b) write the properties of good refrigerant
- 5.Explain the working principle of vapour absorption refrigerator with neat sketch
6. Explain the working principle of vapour compression refrigerator with neat sketch

UNIT-IV

1. Explain working principle of 4 stroke petrol engine with neat sketch?
2. Explain working principle of 4 stroke Diesel engine with neat sketch?
3. Explain working principle of 2 stroke petrol engine with neat sketch?
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5. a) Compare two stroke engines with four stroke engines?
b) Compare Compression ignition engine with Spark ignition engine?
6. a) what is an I.C engine? Classify different types of engines
b) explain the basic engine components and nomenclature?

UNIT-V

1. Explain in detail about belt and rope drives with neat sketches.
2. Describe the following a) velocity ratio b) slip c) length of the belt d) ratio of friction tensions
3. An engine, running at 150 r.p.m., drives a line shaft by means of a belt. The engine pulley is 750 mm diameter and the pulley on the line shaft being 450 mm. A 900 mm diameter pulley on the line shaft drives a 150 mm diameter pulley keyed to a dynamo shaft. Find the speed of the dynamo shaft, when a) there is no slip, and b) there is a slip of 2% at each drive.
4. The power is transmitted from a pulley 1 m diameter running at 200 r.p.m. to a pulley 2.25 m diameter by means of a belt. Find the speed lost by the driven pulley as a result of creep, if the stress on the tight and slack side of the belt is 1.4 MPa and 0.5 MPa respectively. The Young's modulus for the material of the belt is 100 MPa.
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6. Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25 ?
7. A shaft rotating at 200 r.p.m. drives another shaft at 300 r.p.m. and transmits 6 kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5 m in diameter. Calculate the stress in the belt, if it is 1. an open belt drive, and 2. a cross belt drive. Take $\mu = 0.3$.

UNIT-VI

1. a) Explain different types gears
b) Explain about law of gearing

2. a) Explain different types of gear profiles
b) Write the applications of the gear

3. a) Explain different types gear trains with neat sketch

b) Two parallel shafts, about 600 mm apart are to be connected by spur gears. One shaft is to run at 360 r.p.m. and the other at 120 r.p.m. Design the gears, if the circular pitch is to be 25 mm.

4. The speed ratio of the reverted gear train, as shown in Fig. 13.5, is to be 12. The module pitch of gears A and B is 3.125 mm and of gears C and D is 2.5 mm. Calculate the suitable numbers of teeth for the gears. No gear is to have less than 24 teeth

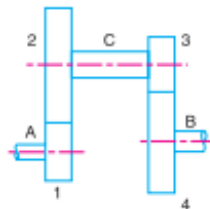
5. A compound train consists of six gears. The number of teeth on the gears are as follows :

Gear : A B C D E F No. of teeth : 60 40 50 25 30 24

The gears B and C are on one shaft while the gears D and E are on another shaft. The gear A drives gear B, gear C drives gear D and gear E drives gear F. If the gear A transmits 1.5 kW at 100 r.p.m. and the gear train has an efficiency of 80 per cent, find the torque on gear F.

6. In a reverted gear train, as shown in Fig two shafts A and B are in the same straight line and are geared together through an intermediate parallel shaft C. The gears connecting the shafts A and C have a module of 2 mm and those connecting the shafts C and B have a module of 4.5 mm. The speed of shaft A is to be about but greater than 12 times the speed of shaft B, and the ratio at each reduction is same.

Find suitable number of teeth for gears. The number of teeth of each gear is to be a minimum but not less than 16. Also find the exact velocity ratio and the distance of shaft C from A and B





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I B.TECH - II SEM Question Bank

Subject Name: ENGG. PHYSICS

Branch: CIVIL, EEE

Faculty: Mr.APPARAO.P

UNIT-1

- State and explain the Principle of superposition of waves. - 4M
 - Explain the formation of Newton's rings and obtain an expression for the diameter of the dark rings in reflected system. – 6M
- In Newton's rings experiment, diameter of the tenth dark ring due to wavelength 6000\AA in air is 0.5 cm. Find the radius of curvature of the lens. – 4 M
 - If the air film in the Newton's rings apparatus is replaced by an oil film, then how does the radius of the rings change? Explain. – 6M
- What are the necessary conditions to get clear and distinct interference fringes – 4M
 - Describe principle ,construction and working of Michelson Interferometer. - 6M
- Explain the colours in a thin film when exposed it to a sun light – 4M
 - Explain why the centre of Newton's rings is dark in the reflected system. Why are they circular? 6M
- Distinguish between Monochromatic and Polychromatic light sources, Give one example for each
 - With a ray of diagram, discuss the theory of thin films and the condition constructive and destructive interference in the case of reflected light.—7M
- Describe principle ,construction and working of Febry-Perot Interferometer. - 6M
 - In Newton's rings experiment, diameter of 10^{th} dark ring due to wavelength 6000 \AA in air is 0.5 cm. Find the radius of curvature of lense.

UNIT—II

- What are the types of diffraction and give the difference between them ? 4 M
 - Obtain the condition for primary maxima in Fraunhofer diffraction due to single slit and derive an expression for width of the central maxima - 6 M
- What is the difference between interference and diffraction –4M
 - Explain the diffraction due to two parallel slits and obtain the Intensity of light on the screen.—6M

3. a) Define the grating and Explain with necessary theory, the Fraunhofer diffraction due to 'N' parallel slits.- 6 M
 b) Calculate the maximum number of order possible for a transmission grating - 4 M
4. a) What happens to the diffraction fringes, if the slit width is reduced in single slit experiment? Explain why?.- 6 M
 b) A grating has 6000 lines/cm.Find the angular separation between two wavelengths of 500 nm and 510 nm in 3rd order – 4M
5. a) What is meant by Diffraction of light? Explain it on the basis of Huygen's wave theory ? 4 M
 b) Explain the theory of plane transmission grating and derive equations for maxima and minima.- 6M
6. a) Define resolving power of grating and explain Rayleigh criterion for resolution and determine the resolving power of the Telescope - 6 M
 b) How many orders will be visible ,if wave length of light is 5000 Å ? Given that the number of lines per centimeter on the grating is 6655. - 4 M

UNIT – III

1. a) What is a half wave plate and Quarter wave plate? Deduce an expression for its thickness-6 M
 b) Calculate the thickness of half wave plate of quartz for a wavelength 500nm. Here $\mu_e = 1.553$ and $\mu_o = 1.544$. - 4 M
2. a) Distinguish between polarized and unpolarized lights –3M
 b) State and explain Brewster's law? Discuss how the plane, Circular and Elliptical
3. a) Write a note on double refraction? 4M
 b) Explain the principle, construction and working of a Nicol prism.-6M
4. a) Write the difference between Spontaneous and Stimulated Emissions.– 4M
 b) Explain the working of Ruby laser with the help of neat energy level diagram..– 6M
5. a) What is population inversion and how can it be achieved ?.- 4 M
 b) Explain the working of He-Ne gas laser with the help of neat energy level diagram.- 6 M
6. a) Explain Einstein's coefficients. Derive the relation between them.-5M
 b) What are the characteristics and applications of LASER beam.-5M

UNIT – IV

1. a) What is an electrical potential. Derive the electrical potential in an non-uniform electric field - 6M
b) Write the Maxwell's electromagnetic equations in differential or integral form.– 4M
2. a) State and explain stokes and Gauss divergence theorems – 4 M
b) Derive velocity of electromagnetic wave in a dielectric medium.– 6M
3. a) State and prove Gauss's divergence theorem and explain its importance.- 6 M
b) What is divergence? Show that divergence of a vector field is a scalar ?– 4 M
4. a) What is a gradient? Show that gradient of a scalar is a vector- 4 M
b) State and prove stokes theorem? Explain its importance -6 M
5. a) Define scalar field? Explain with examples - 3 M
b) Derive wave equation for an electric field in dielectric medium.- 7 M
6. a) Define vector field? Explain with examples - 3 M
b) Derive wave equation for a magnetic field in dielectric medium.- 7 M

UNIT—V

1. a) Derive time independent wave equation for a free particle – 5 M
b) Derive time dependent Schrodinger's wave equation for a free particle.– 5M
2. a) Derive Eigen values and Eigen functions for a particle in a one dimensional potential box.-7 M
b) Calculate the minimum energy of free electron trapped in a one dimensional box of width 0.3 nm (given $h = 6.63 \times 10^{-34}$ J. S and $m_e = 9.1 \times 10^{-31}$ Kg).– 3M
3. a) What is Fermi level and explain the Fermi-Dirac distribution function of electron in ametal. .- 4 M
b) Discuss the variation with temperature on the Fermi-Dirac distribution - 6 M
4. a) What are the properties of Matter waves?.- 4 M
b) Distinguish between Lorentz-Drude theory and Sommerfeld theory of metals – 6 M
5. a) What is the most probable position for a particle in 1D potential box of width L in the first quantum state, explain graphically. How matter waves are different from Electromagnetic waves?.- 7 M

- b) If E is the ground state of the particle confined to move in a 3D potential box, what would be the increase in the energy from second energy to next higher energy level– 3M
6. a) Based on Sommerfeld quantum free electron theory, derive an expression for electrical conductivity in metals.- 6 M
- b) Explain the salient features & draw backs of Classical free electron theory..- 4 M

UNIT- VI

1. a) What is Bloch theorem. Explain.- 3 M
- b) Explain the Kronig-penny model of solids and show that it leads to energy band structure.- 7 M
2. a) Explain the concept of effective mass of an electron..- 3 M
- b) What do you understand by drift and diffusion currents in the case of a semiconductor? Deduce Einstein's relation relating to these currents..– 7 M
3. a) Explain P- type extrinsic semiconductors.- 4 M
- b) Derive an expression for Fermi energy in extrinsic P-type semiconductor - 6 M
4. a) State and explain Hall Effect – 5 M
- b) Derive an expression for Hall coefficient and Give any two of its applications..- 5M
5. a) Distinguish between Intrinsic and Extrinsic semiconductors - 2M
- b) Derive the expression for concentration carriers in intrinsic semiconductor.– 8M
6. a) Distinguish between N- type and P- type extrinsic semiconductors – 4 M
- b) Derive the expression for Fermi energy in N-type extrinsic semiconductor..– 6M



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Department of Basic Sciences & Humanities

SUBJECT: MATHEMATICAL METHODS

YEAR /SEM : I/II

FACULTY: B.CH.K.PREETHI, Asst. Prof.

BRANCHS: CIVIL & EEE

UNIT-I

1. a) Find the Real root of the equation $x^2 - x - 4 = 0$ using iteration method (5M)
- b) Find the Real root of the equation $x^4 - x - 10 = 0$ using Newton Raphson method (5M)
- 2 (a) Using Newton-Rapson method find the root of the equation $x + \log_{10} x = 3.375$ correct to four decimal places. (5M)
- b) Find the Real root of the equation $e^x - 4x^2 = 0$ using Bisection method. (5M)
- 3 (a) Find the Real root of the equation $x + \log_{10} x - 2 = 0$ using false position method (5M)
- (b) Solve $x^3 - 2x - 5 = 0$, for a positive root by iteration method. (5M)
- 4 (a) Using Newton – Raphson method, find a root of the equation $2x - 3\sin x = 5$ near $x=3$ correct to three decimal places. (5M)
- (b) Develop an Iterative formula to find $\frac{1}{N}$ using Newton Raphson method (5M)
- 5(a) Using Regula-Falsi method, find the root of $x^3 - x - 2 = 0$, over (1, 2) (5M)
- (b) By using Newton-Raphson method, find the root of $x^4 - x - 10 = 0$, correct to three decimal places. (5M)
- 6(a) Solve the system of equations by Newton Raphson method $3yx^2 - 10x + 7 = 0$ and $y^2 - 5y + 4 = 0$ (5M)
- (b) Solve the system of equations by Newton Raphson method $x^2 + y^2 - 1 = 0$ and $y - x^2 = 0$ (5M)

UNIT-II

1(a) Using Lagrange's interpolation formulae find the value of y (12) from the data (5M)

x	5	7	9	13
y	11	13	18	27

(b) Determine the value of f(x) at x = 25 for the following data (5M)

x	20	24	28	32
f(x)	24	32	35	40

2 (a) Find f(142) using Newton's forward formula for the following table

x	140	150	160	170	180	(5M)
Y=f(x)	3.685	4.854	6.302	8.076	10.225	

(b) Calculate f(3) from the following table. (5M)

X	0	1	2	4	5	6
f(x)	1	14	15	5	6	19

3(a) Given that f(6500) = 80.6223, f(6510) = 80.6846, f(6520) = 80.7456, f(6530) = 80.8084, Find f(6526) using Gauss backward interpolation formula. (5M)

(b) Using gauss forward difference formula, find y(12) from the given table (5M)

x	1	6	11	16	21	26
y	5	10	14	18	24	32

4 (a) Using Gauss Backward difference polynomial, find y(5) given that (5M)

X	2	4	6	8	10
Y	5	11	13	15	17

(b) Use Gauss backward interpolation formula to find f(32) given that f(25) = 0.2707, f(30) = 0.3027, f(35) = 0.3386, f(40) = 0.3794. (5M)

5(a) Prove that $(1 + \Delta)(1 - \nabla) = 1$. (3M)

(b) Compute f(27) using Lagranges formula from the following table

X	14	17	31	35
F(x)	68.7	64	44	39.1

(6M)

6(a) Prove that (i) $\mu^2 = 1 + \frac{\delta^2}{4}$ (ii) $\delta = E^{\frac{1}{2}} - E^{-\frac{1}{2}}$. (6M)

(b) If the interval of differencing is unity, find $\Delta^2 \sin(px + q)$. (4M)

UNIT-III

1(a) Using modified Euler method solve numerically the equation $\frac{dy}{dx} = 2 + \sqrt{xy}$, with $y(1)=1$ to find $y(1.2)$. (5M)

(b) Using Euler's method, solve for $y(0.6)$ from $\frac{dy}{dx} = -2xy$, $y(0) = 1$ using step size 0.2. (5M)

2(a) Given $\frac{dy}{dx} = x + \sin y$, $y(0) = 1$, compute $y(0.2)$ and $y(0.4)$ using Euler's modified method. (5M) (b) A curve is observed to pass through the points given in the following table 5M

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	2	2.4	2.7	2.8	3	2.6	2.1

By using Simpson's rule find the area bounded by the curve and x axis between $x=1$ and $x=4$

3(a) $y' = x^2 y + 1$, $y(0) = 1$ using Taylor's method up to 3rd degree term and compute $y(0.1)$

(5M)

(b) Solve $y' = y - x^2$, $y(0) = 1$ using Picard's method up to 4th approx. $y(0.1)$ & $y(0.2)$

(5M)

4(a) Evaluate $\int_0^{0.6} e^{-x^2} dx$ by using Simpson's 1/3rd rule, taking seven ordinates. 5M

(b) Evaluate $\int_0^{\pi} \frac{\cos x}{1+x} dx$ by (i) Trapezoidal rule (ii) Simpson's 3/8th Rule (5M)

5(a) Find $y(0.1)$ using 4th order Runge-Kutta method given that $y' = x + x^2 y$, $y(0) = 1$. (5M)

(b) Use Runge-Kutta 4th order to compute $y(1.2)$ for the equation $y' = \frac{x^2+y}{x}$, $y(1) = 2$ (5M)

6. (a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's 3/8th rule 5M

(b) Evaluate $\int_0^1 \frac{dx}{1+x}$ by using Trapezoidal rule. 5M

UNIT IV

1. (a) Obtain the Fourier series for $f(x) = e^x$ in the interval $0 < x < 2\pi$. 5M
(b) Find a Fourier series to represent the function $f(x) = x - x^2$ from $x = -\pi$ to $x = \pi$ 5M

2. (a) Expand $f(x) = x \sin x$ as a Fourier series in the interval $-\pi < x < \pi$. 5M

And show that
$$\frac{1}{1.3} - \frac{1}{3.5} + \frac{1}{5.7} - \frac{1}{7.9} \dots = \frac{\pi-2}{4}$$

- (b) Find the Fourier series of $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \frac{\pi}{4}, & 0 < x < \pi \end{cases}$ 5M

3. (a) Obtain the Fourier series to represent $f(x) = \frac{1}{4}(\pi - x^2)$, $0 < x < 2\pi$. 5M

- (b) Find the Fourier series of the periodic function defined as $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$

Hence, deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$ 5M

4. (a) Find Fourier cosine series of the function $f(x) = \sin x$ in $(0, \pi)$ and hence show that

$$\sum_{n=1}^{\infty} \frac{1}{4n^2-1} = \frac{1}{2} \quad 5M$$

- (b) Find the half range sine series of $f(x) = \begin{cases} \frac{\pi}{2}, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$ 5M

5. (a) Find the Fourier series of the function $f(x) = \begin{cases} 0, & 0 < x < 1 \\ x^2, & 1 < x < 2 \end{cases}$ 5M

- (b) Find Fourier cosine series for $f(x) = x(x-2)$, in $0 \leq x \leq 2$ and hence find the sum of the series

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots \quad 5M$$

6. (a) Find the Fourier series of periodicity 2 for $f(x) = x + x^2$, in $0 < x < 2$ 5M

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

UNIT -V

1. (a) Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$ where $u(x, 0) = 6e^{-3x}$. 5M
- (b) Using the method of separation of variables, solve $4\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 3u$, given that $u(0, y) = 3e^{-y} - e^{-5y}$ 5M
2. A tightly stretched string with fixed end points $x=0$ and $x=l$ is initially in a position given by $y = y_0 \sin^3\left(\frac{\pi x}{l}\right)$. If it is released from this position, find the displacement $y(x, t)$. 10M
3. Solve the equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ with boundary conditions $u(x, 0) = 3\sin(n\pi x)$, $u(0, t) = 0$ and $u(l, t) = 0$, where $0 < x < l, t > 0$. 10M
4. Solve the laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ subject to the conditions $u(0, y) = u(l, y) = u(x, 0) = 0$ and $u(x, a) = \sin(n\pi x/l)$. 10M
5. Solve by the method of separation of variables $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$ and $u(0, y) = 8e^{-3y}$ 10M
6. Find the solution of the wave equation $\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}$, if the initial deflection is $f(x) = \begin{cases} \frac{2k}{l}x, & \text{if } 0 < x < \frac{l}{2} \\ \frac{2k}{l}(l-x), & \text{if } \frac{l}{2} < x < l \end{cases}$ and initial velocity equal to 0. 10M

UNIT VI

1. (a) Using Fourier integral, Show that $\int_0^\infty \frac{\cos \lambda x}{\lambda^2 + a^2} d\tau = \frac{\pi}{2a} e^{-ax}$, $a > 0, x \geq 0$. 5M
- (b) Find the Fourier transform of $f(x) = \begin{cases} x, & \text{if } |x| \leq 1 \\ 0, & \text{if } |x| > 1 \end{cases}$ 5M
2. (a) Find the Fourier transform of $\frac{1}{\sqrt{|x|}}$ 5M
- (b) Find the Fourier sine transform of $e^{-|x|}$. 5M
3. (a) If $F(p)$ or $F(s)$ is the complex Fourier transform of $f(x)$ then the complex Fourier transform of $f(x) = \cos ax$ Then find the complex Fourier transform of $f(x) = \cos ax$ 5M
- (b) Find the Fourier sine and cosine transforms of $2e^{-5x} + 5e^{-2x}$ 5M

4. (a) Find the Fourier sine transform of $f(x) = e^{-ax}$, $a > 0$ and deduce the inversion formula. 5M
(b) Find the inverse Fourier sine transform of $f(x)$ of $F_s(p) = \frac{p}{1+p^2}$. 5M
5. (a) Find the Fourier Cosine transform of $\frac{e^{-ax}}{x}$ 5M
(b) Find the inverse Fourier sine transform $f(x)$ of $F_s(p) = \frac{e^{-ap}}{p}$; and show that $F_s^{-1}(1/p) = 1$. 5M
6. (a) Prove that $F[x^n f(x)] = (-i)^n \frac{d^n}{dp^n} [F(p)]$. 5M
(b) Prove that $F\left[\frac{d^n}{dx^n} f(x)\right] = (-ip)^n F(p)$. where $F[f(x)] = F(p)$. 5M



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I B.TECH Question Bank

Subject : ENGLISH-II Branch: EEE, CIVIL.

Faculty: MS. S.VANAJA

Unit-I

1.A. Why does the author say that the Know how produced by Science and technology is an unfinished sentence?

1. B. What is hovercraft?

1. C. Give synonyms for the following-1. Strengthen, 2. Resource.

2. A. Explain Schumacher views on education?

2. B. What was the objective of the SLV project?

2. C. Give the synonyms of the following

1. Precipitate

2. Antecedent

3. A. What are the arguments which the author put forward to show that education is necessary?

3. B. Who helped Kalam design the guidance systems for Agni Missile?

3. C. Give synonyms for following-

1. Apprehension

2. Brink

4. A. What should be done to overcome the problems of modern life?

4. B. Why Abdul Kalam is called the Missile Man of India?

4. C. Give Antonyms for the following words-

1. Decline

2. Civilized

5. A Write a letter to the editor of a leading newspaper on the problem of eve - teasing in your city.

5. B. Explain the work Kalam did at DRDO.

5. C. Give Antonyms for the following words

1. Inferior

2. Conceal

6. A. How is positive attitude helpful for the students?

6. B .Name a few awards that Kalam won.

6. C. Give antonyms for the following words-

1. Culminate

2. Persuade

UNIT-II

1. A Describe any modern invention with its positive and negative effects on the society.

1. B. At what age did Raman join the graduation class? Can you remember an interesting anecdote concerning his English teacher?

1.C. Write the superlative adjectives for the following words

i. Beautiful ii. Sweet

2. A. Who is responsible for the destructive use of scientific inventions – science or people?

2.B. What were some of the changes that Raman had initiated at the Indian Institute of Science?

2. C. Write the superlative adjectives for the following words

- i. Tall ii. Bright

3. A. What, according to the author, is the first reaction of a layman to the bomb on Hiroshima?

3.B Where did Raman do his M. A. from? What was his subject?

3. C. Write superlative adjectives for the following words:

- i. Clever ii. Hard

4. A. What are views of author on science and its repercussions?

4. B. Why did Raman resign from his job after 10 year of service? Why did he take a cut in his salary?

4. C. Fill in the blanks with appropriate words

1. SLV stands for

2. Kalam's first school was

5. A. You are Mr. Deepak, the librarian of KV AFA. Write an email to Rana book depot, Hyderabad requesting them to cancel your order for English literary books and Children's story book. Give reasons for cancellation of the order.

5. B. Explain the Raman Effect.

5. C. Write synonyms for the following words:

- i. Mooting
ii. Distinguished

6. A. Explain the importance of Self-Management.

6. B. Describe the work that got Raman a Noble Prize.

6. C. Write the adjective form for the following words:

- i. Hunger
ii. Health

1.A. What is Cultural Shock? Explain.

1. B. What were the objectives Bhabha wanted to fulfill with the nuclear Programme?

1. C. Fill in the blank with an appropriate form of the verb given in brackets

1. The deaf and the blind --- (find) it was very difficult to acquire the amenities of conversation.

2. She --- (like) coffee compared to tea.

2. A. How does the author define 'culture shock'? What are the symptoms according to him?

2. B. What was the most devastating event during the World War II?

2. C. Fill in each blank with an appropriate form of the verb given in brackets

1. When he --- (come) home I was taking shower.

2. He --- (finish) homework before I called him.

3. A. Write the four stages of cultural shock.

3. B. Note contributions of Ernest Rutherford.

3. C. Fill in the blank with an appropriate form of the verb given in brackets

1. The train --- (have left) before I reached the station.

2. She --- (lost) the key just now.

4. A. Prepare a 5 minutes speech expressing your views on the following topic: *Betting in sports.*

4. B. Who was Dirac? What was his major contribution?

4. C. Fill in the blank with an appropriate form of the verb given in brackets

1. She --- (play) football every day.

2. She --- (go) to church every Sunday.

5.. A. Explain Non - Verbal Communication.

5. B. What were Bhabha's efforts to set up research institute in India?

5. C. Fill in the blank with an appropriate form of the verb given in brackets

She --- (see) Delhi many times.

She --- (have work) a lawyer since 2000.

6.A. What is Body Language?

6.B. What is the message of Bhaba to the youth?

6.C. Fill in the blank with an appropriate form of the verb given in brackets

1. Summer-----(come) after winter.

2. She----- (meet) the principal yesterday.

English –II SEM-II MID II -QUESTION BANK-R16 REGULATIONS

UNIT-IV

I 1. What seems to have been the original purpose of the lottery? What do people believe about it?-5M

2. What was Bose's attitude towards education as he grew up?-3M

3. In questions given below out of four alternatives, choose the one which can be substituted for the given word/sentence.-2M

a. That which cannot be corrected

A). Unintelligible B). Indelible C). Illegible D). Incurable

b. The study of ancient societies

A). Anthropology B). Archaeology C). History D). Ethnology

II 1. Is it important that the original paraphernalia for the lottery had been lost? What do you suppose the original ceremony was like? Why have some of the villages given up this practice? Why hasn't this one?-5M

2. Why did Bose shift his interest? What were his contributions to the two fields he worked in?-3M

3. In questions given below out of four alternatives, choose the one which can be substituted for the given word/sentence.-2M

A.A person of good understanding knowledge and reasoning power

A). Expert B). Intellectual C). Snob D). Literate

B. A person who insists on something

A). Disciplinarian B). Stickler C). Instantaneous D). Boaster

III 1. Is the lottery a collective act of murder? Is it morally justified? Is tradition sufficient justification for such actions? How would you respond to cultures that are different from ours that perform "strange" rituals?-5M

2. Give an account of Bose's experiments relating to plant responses.-3M

3. In questions given below out of four alternatives, choose the one which can be substituted for the given word/sentence.-2M

a. State in which the few govern the many

A). Monarchy B). Oligarchy C). Plutocracy D). Autocracy

B. A style in which a writer makes a display of his knowledge

A). Pedantic B). Verbose C). Pompous D). Ornate

IV. 1. Write an essay on- "Global Warming"-5M

2. Write the views of the author on J.C.Bose. -3M

3. In questions given below out of four alternatives, choose the one which can be substituted for the given word/sentence.-2M

a. A person who knows many foreign languages

A). Linguist B). Grammarian C). Polyglot D). Bilingual

b. One who possesses many talents?

A). Versatile B). Nubile C). Exceptional D). Gifted

V. 1. Write a newspaper report about an accident that took place on the main road in your town.-5M

2. Explain the childhood and early life of J.C.Bose.-3M

3. In questions given below out of four alternatives, choose the one which can be substituted for the given word/sentence.-2M

a. One who eats everything

A). Omnivorous B). Omniscient C). Irascible D). Insolvent

b. The custom or practice of having more than one husband at same time

A). Polygyny B). Polyphony C). Polyandry D). Polychromic

UNIT- V

I.1.How does climate change affect human health?-5M

2. Explain the early life of Prafulla Chandra Ray.-3M

3. Fill the blank with suitable preposition.-2M

a. Peter is playing tennis _____ Sunday.

b. What are you doing _____ the afternoon?

II. 1. Write a short note on aeroallergens.-5M

2. What are the contributions and achievements of Prafulla Chandra Ray?-3M

3. Fill the blank with suitable preposition.-2M

A. The shops open _____ nine.

B. She has never seen the sea _____ winter.

III. 1.How can we prevent climate change?-5M

2. Explain Assertiveness.-3M

3. Fill the blank with suitable preposition.-2M

A.I have been waiting for you _____ seven o'clock.

B.I will have finished this essay _____ Friday.

IV. 1.How are morality and excessive heat related?-5M

2. Write an essay on – “Climate Change”.-3M

3. Fill the blank with suitable preposition.-2M

- a. We are going to see my parents _____ the weekend.
- b. In 1666, a great fire broke out _____ London.

V. 1. What is public health surveillance and why is it important?-5M

2. Write an article on- “Air Pollution”.-3M

3. Fill the blank with suitable preposition.-2M

- a. My brother's birthday is _____ the 5th of November.
- b. My birthday is _____ May.

UNIT- VI

I. 1.What does SMART mean in goal setting?-5M

2. Who is Paul Allen? Write the achievements of Allen with Gates.-3M

3. Fill the gap with the suitable verb.-2M

A. One of my friends _____gone to France. (has / have)

B. Each of the boys _____ given a present. (was / were)

II.1. Why IBM approached Bill Gates? Explain the problems and prospects of their agreement.-5M

2. Who is Srinivasa Ramanujan?-3M

3. Fill the gap with the suitable verb.-2M

A. Neither of the contestants_____ able to win a decisive victory. (was / were)

B. Oil and water _____ not mix. (do / does)

III.1. Explain the family details of Bill Gates.-5M

2. Explain the education and research career of Srinivasa Ramanujan?-3M

3. Fill the gap with the suitable verb.-2M

a. He and I _____ at Oxford together. (was / were)

b. Slow and steady _____ the race. (win / wins)

IV. 1. What are the advantages of team work?-5M

2. Explain the achievements of Ramanujan at Cambridge.-3M

3. Fill the gap with the suitable verb.-2M

A. Neither Peter nor James _____ any right to the property. (has / have)

B. No prize or medal _____ given to the boy, though he stood first in the examination. (was / were)

V. 1. Why did Bill Gates and Allen sue a case against the new owner of MITS?-5M

2. Write a report on- “Blood donation camp”.-3M

3. Fill the gap with the suitable verb.-2M

a. Either Mary or Alice responsible for this. (is / are)

b. Neither the Minister nor his colleagues given any explanation for this.
(have / has)