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R18

Course Code: A30004



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

**B.Tech I Semester Supplementary Examinations January-2025**

**Course Name: Linear Algebra and Calculus**

**(Common for All)**

**Date: 23.01.2025 AN**

**Time: 3 hours**

**Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions (Compulsory)**

**Each question carries TWO marks.**

**10x2=20M**

1. Define Echelon Form. 2 M
2. Find the Determinant of matrix  $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$  2 M
3. If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  Show that  $A^2 - 5A - 2I = O$  2 M
4. Write the quadratic form corresponding to the symmetric matrix  $\begin{bmatrix} 1 & -1 & 2 \\ -1 & 2 & -2 \\ 2 & -2 & 3 \end{bmatrix}$  2 M
5. Show that the series  $1 - \frac{1}{3!} + \frac{1}{5!} - \dots$  is converges. 2 M
6. Test for convergence of the series whose  $n^{\text{th}}$  term is  $\frac{3n-1}{2^n}$  2 M
7. State Rolle's theorem. 2 M
8. Find the Taylor's series expansion of  $\sin x$  in powers of  $x - \frac{\pi}{4}$  2 M
9. Find first and second order partial derivatives of  $f(x, y) = ax^2 + by^2 + 2hxy$  and verify  $\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x}$ . 2 M
10. Find first and second order partial derivatives of  $f(x, y) = x^3 + y^3 - 3axy$ . 2 M

**PART-B**

**Answer any FIVE questions. One question from each unit either A or B (Compulsory)**

**Each question carries TEN Marks.**

**5x10=50M**

11. A. i) Solve the system of equations using Gauss Elimination Method.  
 $3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4$  5 M  
 ii) Solve completely the system of equations  
 $4x + 2y + z + 3w = 0, 6x + 3y + 4z + 7w = 0, 2x + y + w = 0$  5M

**OR**

11. B. Find the Inverse of the matrix  $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$   
 by Gauss Jordan Method. 10M

**(P.T.O.)**

12. A. Diagonalize the matrix  $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$  10M

OR

12. B. Apply Cayley-Hamilton theorem to evaluate the matrix represented by  $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ , where  $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$  and also find its inverse and  $A^4$ . 10M

13. A. Test for convergence of the series  $1 + \frac{x}{2} + \frac{x^2}{5} + \frac{x^3}{10} + \dots$  10M

OR

13. B. Test the convergence of  $\sum_{n=1}^{\infty} \frac{2n-1}{n(n+1)(n+2)}$ . 10M

14. A. Verify Rolle's Theorem for the function  $f(x) = (x-a)^m(x-b)^n$  in  $[a, b]$  10M

OR

14. B. State and Prove the relation between the Beta and Gamma Function. 10M

15. A. i) Determine whether the functions  $u = \frac{x+y}{1-xy}$ ,  $v = \tan^{-1}x + \tan^{-1}y$  are functionally dependent. If so, find the relation between them. 5M

ii) If  $x = r \cos \theta$ ,  $y = r \sin \theta$ , Find  $\frac{\partial(x,y)}{\partial(r,\theta)}$  and  $\frac{\partial(r,\theta)}{\partial(x,y)}$ . Also show that

$$\frac{\partial(x,y)}{\partial(r,\theta)} \cdot \frac{\partial(r,\theta)}{\partial(x,y)} = 1 \quad 5M$$

OR

15. B. Discuss the maxima and minima of  $x^3y^2(1-x-y)$ . 10M

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**R18**

Course Code: A30008



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
**(UGC AUTONOMOUS)**

**B.Tech I Semester Supplementary Examinations January-2025**

**Course Name: Engineering Physics**

**Branch : CIVIL/ME**

**Date: 25.01.2025 AN**

**Time: 3 hours**

**Max.Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions (Compulsory)**

**Each question carries TWO marks.**

**10x2=20M**

1. Define transverse waves and longitudinal waves. 2 M
2. Define wave transfers energy. Does it transfer momentum. 2 M
3. What are two necessary conditions to obtain interference phenomenon. 2 M
4. Outline the resolving power of the grating. 2 M
5. List the essential components of the laser. 2 M
6. Compute the acceptance angle of an optical fiber, having a core refractive index  $n_1 = 1.50$  and the refractive index of the cladding  $n_2 = 1.45$ . 2 M
7. Draw the B-H curve and identify the coercively and retentively in the curve. 2 M
8. Calculate the value of Bohr Magnetron of electron of mass  $9.1 \times 10^{-31} \text{kg}$  2 M
9. Mention two top down approaches to synthesize nanoparticles 2 M
10. Summarize the concept of quantum confinement 2 M

**PART-B**

**Answer any FIVE questions. One question from each unit either A or B (Compulsory)**

**Each question carries TEN Marks.**

**5x10=50M**

11. A. Derive an expression for the total energy of a particle executing simple harmonic motion. 10M
- OR
11. B. (a) Discuss the factors affecting the acoustics of buildings. Mention at least 2 remedies. 6M  
(b) Calculate the speed of transverse wave travel down the rope when it is stretched by 80 N if frequency of wave is 10 Hz and length of rope is 5m and its mass is 1 kg. 4M
12. A. Deduce an expression for the constructive and destructive interferences of reflected light in a thin parallel film. 10M

OR

(P.T.O.)

12. B. (a) Distinguish between Fraunhofer and Fresnel diffraction. 6M  
(b) Explain Rayleigh criterion for limit of resolution. 4M
13. A. Explain construction and working principle of Ruby laser. 10M  
OR
13. B. Derive an expression for acceptance angle and numerical aperture. 10M
14. A. Discuss in detail the various polarizations occur in dielectrics 10M  
OR
14. B. List out at least five differences between dia, para and ferro magnetic materials 10M
15. A. Explain the preparation of nanomaterials using sol-gel method with the help of neat sketch. 10M  
OR
15. B. (a) Explain quantum wells, wires and dots with examples. 6M  
(b) List out any four day to day applications of nanoparticles. 4M

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**R18**

Course Code: A30009



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

**B.Tech I Semester Supplementary Examinations January-2025**

**Course Name: Applied Physics**

**Branch :     EEE/CSC/CSM/AID/AIM**

**Date: 25.01.2025 AN**

**Time: 3 hours**

**Max.Marks: 70**

(Note: Assume suitable data if necessary)

**PART-A**

**Answer all TEN questions (Compulsory)**

**Each question carries TWO marks.**

**10x2=20M**

1. State Heisenberg's Uncertainty Principle. 2 M
2. What is the physical significance of a wave function? 2 M
3. State the law of mass action in semiconductors. 2 M
4. State two differences between drift current and diffusion current. 2 M
5. What is the working principle of a solar cell? 2 M
6. State the key difference between radiative and non-radiative recombination. 2 M
7. Define population inversion. Why is it essential for lasing action? 2 M
8. What is total internal reflection and write its importance in optical fiber. 2 M
9. Define polarization and polarizability in dielectrics. 2 M
10. Define magnetic permeability. 2 M

**PART-B**

**Answer any FIVE questions. One question from each unit either A or B (Compulsory)**

**Each question carries TEN Marks.**

**5x10=50M**

11. A. Derive Schrodinger's time-independent wave equation. 10M

**OR**

11. B. Compare Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics and give examples of each system. 10M

12. A. Classify materials into conductors, semiconductors, and insulators based on their band structure and energy gap. 10M

**OR**

12. B. Explain the Hall effect in semiconductors. Derive the expression for Hall voltage and describe the applications of Hall effect. 10M

- 13.A Discuss the formation of Pn junction diode and explain its characteristics with a diagram. 10M

**OR**

13. B. Discuss the working principle of a Light Emitting diode. Illustrate its structure and explain its characteristics with a diagram. 10M

**(P.T.O..)**

14. A. Explain the working of a Ruby laser with a neat energy level diagram. 10M

**OR**

14. B. Derive the expression for acceptance angle and numerical aperture. 10M

15. A. Derive an expression for the electronic polarizability in a dielectric material. 10M

**OR**

15. B. i) Define hysteresis and explain the hysteresis behavior in ferromagnetic materials. 7M

ii) List key applications of magnetic materials: 3M

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**R18**



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY  
(UGC AUTONOMOUS)**

**Examination : B.Tech I Sem Supplementary Examinations January-2025**

**Course Name : Engineering Graphics**

**Course Code : A30312**

**Branch : CE/ME**

**Date & Session : 27-01-2025 FN**

**Duration: 3 hours**

**Max. Marks: 60**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries ONE mark.**

**10x1=10M**

1. What section is obtained when a right circular cone is cut by a section plane parallel to its base and passing through all generators? 1 M
2. How much distance does a rolling circle travel on flat ground when it completes one revolution clockwise without slipping? 1 M
3. When a straight-line AB of 100 mm is parallel to the HP and the VP, what are the lengths of FV and TV? 1 M
4. When a circular plane is parallel to the HP, what is the shape of the TV? 1 M
5. A hexagonal prism, base on the H.P. and a side of the base parallel to and 25 mm in front of the V.P. What is the shape of the TV of the solid? 1 M
6. What is meant by the section of a solid? 1 M
7. What is the difference between parallel-line development and radial-line development? 1 M
8. Why is finding the intersection of solids important in engineering design? 1 M
9. In an isometric view, what is the angle between any two principal axes? 1 M
10. How are circular features represented in isometric views? 1 M

**PART-B**

**Answer any FIVE questions. One question from each unit either A or B (Compulsory)**

**Each question carries TEN Marks.**

**5x10=50M**

11. A. Construct an ellipse when the distance of the focus from the directrix is equal to 50 mm and eccentricity is  $\frac{2}{3}$ . Draw a tangent and normal to the curve at 35 mm from the focus. 10M

**OR**

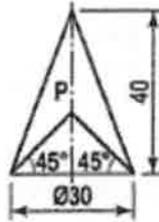
11. B. Draw a diagonal scale of 1: 2.5, showing centimetres and millimetres and long enough to measure up to 20 centimetres. 10M
12. A. A line PQ 75 mm long, has its end P in the V.P. and the end Q in the H.P. The line is inclined at  $30^\circ$  to the H.P. and at  $60^\circ$  to the V.P. Draw its projections. 10M

**OR**

12. B. A square ABCD of 40 mm side has its corner A in the H.P., its diagonal AC inclined at  $30^\circ$  to the H.P. and the diagonal BD inclined at  $45^\circ$  to the V.P. and parallel to the H.P. Draw its projections. 10M
13. A. A regular pentagonal pyramid with the sides of its base 30 mm and height 80 mm rests on an edge of the base. The base is tilted until its apex is 50 mm above the level of the edge of the base on which it rests. Draw the projection of the pyramid when the edge on which it rests, is parallel to the V.P. and the apex of the pyramid points towards V.P. 10M

13. B. A cylinder, 65 mm diameter and 90 mm long, has its axis parallel to the H.P. and inclined at  $30^\circ$  to the V.P. It is cut by a vertical section plane in such a way that the true shape of the section is an ellipse having the major axis 75 mm long. Draw its sectional front view and true shape of the section. 10M

14. A. Draw the development of the lateral surface of the part P of of the cone, front views of which are shown in fig.

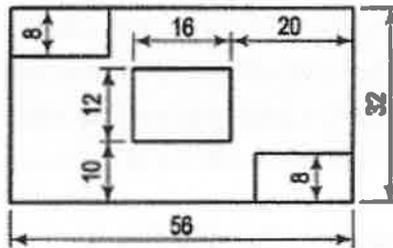
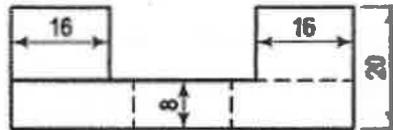


10M

OR

14. B. A vertical cylinder of 80 mm diameter is completely penetrated by another cylinder of 60 mm, their axes bisecting each other at right angles. Draw their projections showing curves of penetration, assuming the axis of the penetrating cylinder to be parallel to the VP. 10M

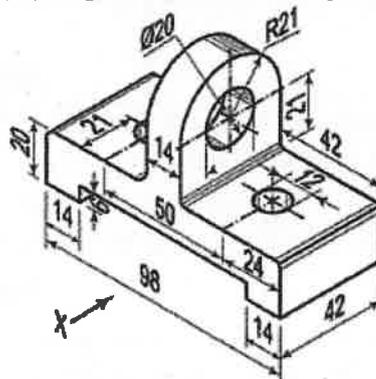
15. A. Convert the following orthographic projections into isometric view.



10M

OR

15. B. Draw Orthographic projections from the following isometric view: (i) Front view. (ii) Side view from the right. (iii) Top view., use first angle method.



10M

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**R18**



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY  
(UGC AUTONOMOUS)**

**Examination : B.Tech I Sem Supplementary Examinations January-2025**  
**Course Name : Programming for Problem Solving**  
**Course Code : A30501**  
**Branch : EEE/ECE/CSE/IT/CSC/CSM/CSD/AID/AIM**  
**Date & Session : 27-01-2025 FN**                      **Duration: 3 hours**                      **Max. Marks: 70**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries ONE mark.**

**10x2=20M**

1. List the Components of Computer? 2 M
2. Define Flowchart? 2 M
3. Explain about goto and break Statement? 2 M
4. What is multi-dimensional array? 2 M
5. Write and explain the syntax of function? 2 M
6. List any four standard string handling functions in C 2 M
7. Explain pointer to pointer? 2 M
8. How to represent self-referential structures? 2 M
9. What are the Different file operations? 2 M
10. Explain about Insertion Sort 2 M

**PART-B**

**Answer any FIVE questions. One question from each unit either A or B (Compulsory)**

**Each question carries TEN Marks.**

**5x10=50M**

11. A. Write down the steps involved for program development in C with an example? 10M

**OR**

11. B. Develop an Algorithm for checking whether a number n is prime and draw the flow chart? 10M

12. A. Contrast while loop and do-while loop? Write a C program for Pyramid Pattern using for loop?

```
*  
***  
*****  
*****  
*****
```

**10M**

**OR**

12. B. Explain briefly how to declare and initialize a Two-dimensional array? Discuss with examples 10M

13. A. What is recursion? Write a C program to find the factorial of a given number using recursion. 10M

**OR**

13. B. Explain about Static Variables and Register Variables in detail 10M

14. A. Explain how to pass pointer variables as function arguments? Explain with example 10M

**OR**

14. B. Justify how the structures different from unions List out the some differences between structures and unions 10M

15. A. Explain the following file handling functions: a. fseek() b. ftell() c. rewind() 10M

**OR**

15. B. Explain the binary search algorithm with example 10M

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R18

Course Code: A30311



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech I Semester Supplementary Examinations January-2025

**Course Name: Engineering Mechanics**

(Common for CE/ME)

**Date: 29.01.2025 AN**

**Time: 3 hours**

**Max.Marks: 70**

(Note: Assume suitable data if necessary)

**PART-A**

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

1. Find the resultant of two forces equal to 50 N and 30 N acting at an angle of 60. Apply triangle law of forces. 2 M
2. Define a Free Body Diagram. Give two examples. 2 M
3. Normal reaction and frictional force between two blocks are 300 kN and 30 kN respectively. Identify its angle of friction. 2 M
4. Elucidate at least four difference between Centroid and Center of gravity. 2 M
5. What is the moment of inertia of a quarter circular area from its centroidal axis parallel to diametrical axis given that, radius  $r = 5m$ . 2 M
6. State Parallel axis theorem. 2 M
7. A rectangular body is moving along a straight path on a rough surface having coefficient of friction ' $\mu$ ' from left to right, apply Newton's law and draw free body diagram, if the body is in dynamic equilibrium. 2 M
8. State the principle of impulse-momentum. 2 M
9. Illuminate the D'Alembert's principle. 2 M
10. State work-energy theorem for a system of particles. 2 M

**PART-B**

**Answer the following. Each question carries TEN Marks.**

**5x10=50M**

- 11.A). Two blocks A and B of mass 50 kg and 100 kg respectively are connected by a string C which passes through a frictionless pulley connected with the fixed wall by another string D as shown in figure 1. Find the force P required to pull the lock B. Also the tension in the string D. Take coefficient of friction at all contact surfaces as 0.3. 10M

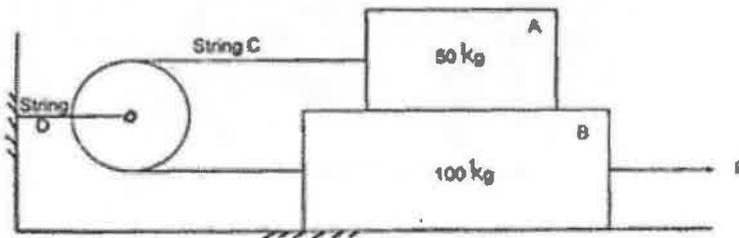


Figure 1

(P.T.O.)

OR

11. B). Determine the resultant of the four forces and one couple that act on the plate as shown in the figure 2. 10M

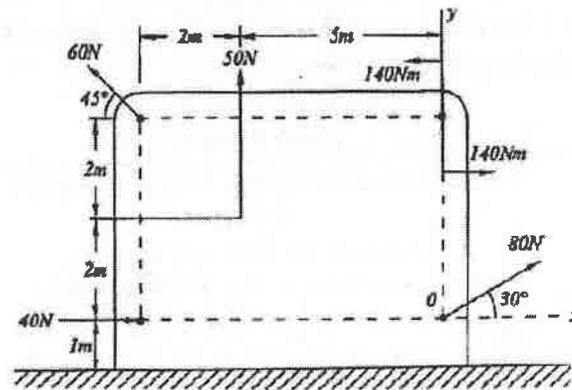


Figure 2

12. A). A ladder 6 m long, weighting 300 N, is resting against a wall at an angle of  $60^\circ$  with the horizontal plane as shown in figure 3. A man weighting 750 N climbs the ladder from position B towards A. At what position along the ladder from the bottom of the ladder does he induce slipping. Take  $\mu$  for both the wall and the ground with the ladder as 0.2. 10M

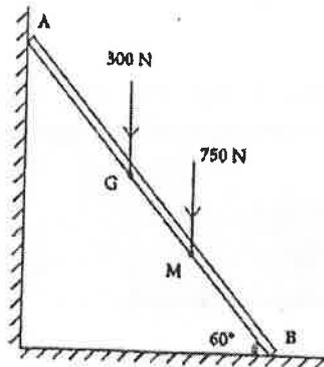


Figure 3

OR

12. B). A semicircle of 90 mm radius is cut out from a trapezium as shown in figure 4. Determine the position of the centroid of the composite section. 10M

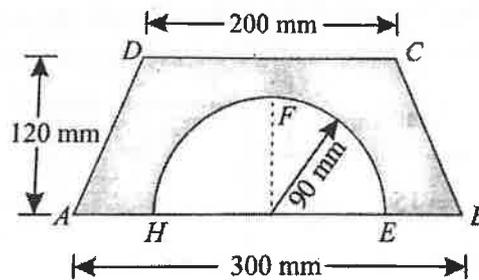


Figure 4

(P.T.O..)

13. A). Locate the centroid and calculate moment of inertia about horizontal and vertical axis through the centroid as shown in figure 5. 10M

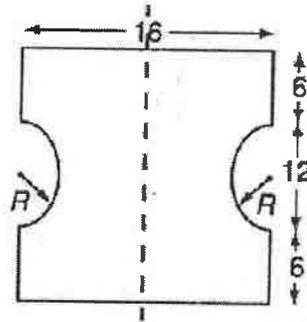


Figure 5

OR

13. B). Find out the mass moment of inertia of a rigid circular cone of base radius  $R$  and mass  $M$  about the axis of the cone. 10M

14. A). i) The acceleration and displacement of moving particle is given as  $a = 24s - s^3$ , which is starting from rest. Determine the velocity of the particle when it travels a distance  $s = 2\text{m}$ . Acceleration 'a' is in  $\text{m/s}^2$  and distance 's' is in m. 5M

- ii) A stone is dropped into a well and the sound of splash was heard after 4 seconds, determine the depth of well if velocity of sound is  $350\text{ m/s}$ . 5M

OR

14. B). i) A particle moves in counter clockwise direction on a circular path of radius  $120\text{ m}$ . It starts from a position that is horizontally to the right of the center of the path and moves so that  $s = 3t^2 + 6t$  where  $s$  is arc distance in m and  $t$  is in seconds. Compute the horizontal and vertical components of accelerations after the particle traveling for 3 seconds 5M

- ii) A bullet weighing  $0.5\text{ N}$  and moving at  $700\text{ m/s}$  penetrates a  $50\text{ N}$  body and emerges with a velocity of  $170\text{ m/s}$ . How far and how long will the block move, if the coefficient of friction between the body and floor is  $0.3$ . 5M

15. A). A particle of mass  $1\text{ kg}$  moves in a straight line under the influence of a force which increases linearly with time at the rate of  $60\text{ N per sec}$ . At time  $t = 0$ , the initial force may be taken as  $50\text{ N}$ . Determine the acceleration and velocity of the particle 4 sec after it started from the rest at the origin. 10M

OR

15. B). A system of weight connected by string passing over pulleys A and B shown in figure 6. Find the acceleration of three weights. Assuming string is weightless and ideal condition for pulleys. 10M

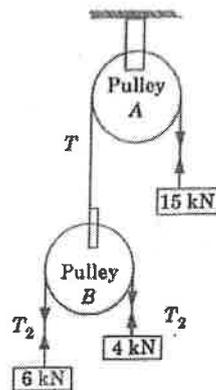


Figure 6

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**R18**

Course Code: A30313



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**

**(UGC AUTONOMOUS)**

**B.Tech I Semester Supplementary Examinations January-2025**

**Course Name: Engineering Drawing**

**(Common for EEE, CSC, CSM, AID & AIM)**

**Date: 29.01.2025 AN**

**Time: 3 hours**

**Max.Marks: 60**

**(Note: Assume suitable data if necessary)**

**PART-A**

**Answer all TEN questions**

**Each question carries ONE mark.**

**10x1=10M**

1. Divide a line of 65mm into 7 equal parts by line division method. 1 M
2. Inscribe a regular hexagon within a circle of 60mm diameter. 1 M
3. Draw the projection of a point 'P' when it is 30mm in front of V.P. and on H.P. 1 M
4. Draw the symbol of the First angle projection. 1 M
5. Define the Pyramid. 1 M
6. Define orthographic projection. 1 M
7. Differentiate between an isometric projection and an isometric view. 1 M
8. Differentiate between isometric line and non-isometric line. 1 M
9. How many views are required in orthographic projections to represent the three dimensions of an object? 1 M
10. Define truncated and Frustum of a solid. 1 M

**PART-B**

**Answer the following. Each question carries TEN Marks.**

**5x10=50M**

- 11.A). Construct a hyperbola with the distance of the focus from directrix being 75mm and an eccentricity  $5/3$ . Also draw the tangent and normal to the curve at any point. 10M

**OR**

11. B). Draw the curve traced out by a point on a circumference of a circle when it rolls, without slip, on horizontal surface, for the distance equal to the perimeter of the circle of diameter of 50 mm. 10M

12. A). A line AB, 50mm long, has its end A in both the H.P. and the V.P. It is inclined at  $30^\circ$  to the H.P. and  $45^\circ$  to the V.P. Draw its projections. 10M

**OR**

12. B). A thin rectangular plate of sides 60 mm x 30 mm has its shorter side in the V.P. and inclined at  $30^\circ$  to the H.P. Project its top view if its front view is a square of 30 mm long sides. 10M

13. A). Draw the projections of a pentagonal prism, base 25 mm side and axis 50 mm long, resting on one of its rectangular faces on the H.P. with the axis inclined at  $45^\circ$  to the V.P. 10M

**OR**

13. B). A cone of base 40 mm diameter and axis 60 mm long touches VP on a point of its base circle. Its axis is inclined at  $30^\circ$  to VP and parallel to HP. Draw its projections. 10M

**(P.T.O.)**

14. A). Draw the isometric views of a hexagonal prism with side of the base 25mm and axis 55mm long, when its axis is (i) Vertical and (ii) Horizontal. 10M

OR

14. B). Draw the isometric views of a Cone with 50mm base diameter and axis 70mm long, when its axis is (i) Vertical and (ii) Horizontal. 10M

15. A). Draw an Orthographic projection of the front, top and side views of fig.1 shown below. 10M  
All dimensions are in mm.

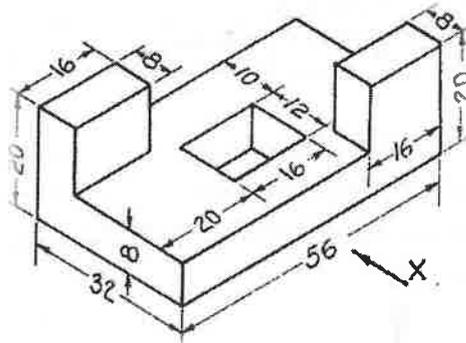


Fig.1

OR

15. B). Draw an isometric view of the fig.2 shown below. All dimensions are in mm. 10M

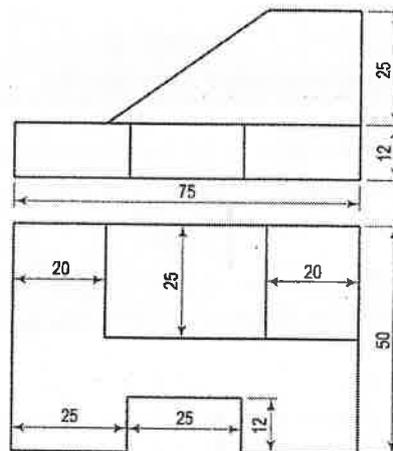


Fig.2

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H.T No: 

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**R18**

Course Code: A30011



**CMR COLLEGE OF ENGINEERING & TECHNOLOGY**  
(UGC AUTONOMOUS)

B.Tech I Semester Supplementary Examinations January-2025

Course Name: **Engineering Chemistry**

(Common for ECE, CSE, IT & CSD)

Date: 29.01.2025 AN

Time: 3 hours

Max.Marks: 70

(Note: Assume suitable data if necessary)

**PART-A**

Answer all TEN questions

Each question carries TWO marks.

10x2=20M

1. Differentiate between Atomic and Molecular Orbitals. 2 M
2. Define homo nuclear diatomic molecules. Give examples. 2 M
3. What is an electrochemical cell? Give example. 2 M
4. What is pilling Bedworth rule? 2 M
5. Define spectroscopy. 2 M
6. What is meant by chromophores and auxochromes? 2 M
7. What are boiler troubles? Write its types? 2 M
8. Define reverse osmosis. 2 M
9. What are stereoisomers? Give examples. 2 M
10. List the type of reactions in organic reaction mechanisms? 2 M

**PART-B**

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Illustrate the molecular orbital energy level diagrams of N<sub>2</sub> and O<sub>2</sub>. 10M  

**OR**
11. B). Explain with an example crystal field splitting of d-orbital in tetrahedral complexes. 10M
12. A). What are secondary batteries? Explain construction, cell reactions and applications of Lead acid battery with neat sketch. 10M  

**OR**
12. B). Summarize the various factors influencing the rate of corrosion. 10M
13. A). Explain principle and applications of IR Spectroscopy with a neat diagram. 10M  

**OR**
13. B). Explain the various electronic transitions that occur in UV-Visible spectroscopy along with applications. 10M
14. A). Demonstrate the estimation of hardness of water by EDTA method. 10M  

**OR**
14. B). Explain in detail the five conditioning methods in internal treatments of boiler feed water. 10M
15. A). Distinguish enantiomers and diastereomers with suitable examples. 10M  

**OR**
15. B). Explain in detail the mechanism of nucleophilic substitution reactions (SN<sup>1</sup> & SN<sup>2</sup> reactions). 10M

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