CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025

Course Name: Linear Algebra and Caculus

(Common for CE, EEE, ME, ECE, CSE, IT, CSC, CSM, CSD, AID & AIM)

Date: 11.07.2025 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.	Define Skew Symmetric Matrix.	2 M
2.	Find the rank of a matrix $A = \begin{pmatrix} -7 & 2 \\ 14 & -4 \end{pmatrix}$	2 M
3.	State Cayley Hamilton Theorem.	2 M
4.	If 2, 3 are eigen values of A. Then find the eigen values of $A^3 + 2I$.	2 M
5.	Test for convergence of the series $\sum cos \frac{1}{n}$	2 M
6.	Define Conditional convergent of a series.	2 M
7.	Find $\Gamma\left(\frac{5}{2}\right)$	2 M
8.	Define Beta function in terms of trigonometric ratios.	2 M
9.	Find the first order partial derivatives of $f(x, y) = 2x^3 + 3y^2 - 6xy$	2 M
10.	If $u(x,y) = x^3 + y^3$, $v(x,y) = 3xy$ then find $\frac{\partial(u,v)}{\partial(x,y)}$	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).

i. Reduce the matrix $\begin{pmatrix} 5 & 3 & 14 & 4 \\ 0 & 1 & 2 & 1 \\ 1 & -1 & 2 & 0 \end{pmatrix}$ into Echelon form and find its rank.   5M

ii. Discuss for what values of λ, μ the simultaneous equations   5M
$x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$ have

a) no solution   b) a unique solution   c) an infinite number of solutions.

OR

11. B). Using Gauss – Seidal Method solve the following system of equations $10 + 2y + z = 9$;   10M
$2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$

12. A).
Find the eigen values and the corresponding eigen vectors of the matrix $\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$ 10M

OR

12. B). Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2xy - 2yz + 2zx$ to canonical form and hence   10M
state nature, rank, index and signature of the quadratic form.

13. A). i. Test for convergence the series $\sum \frac{1}{\sqrt{n+1}-1}$ 5M

ii. Test the series for absolute convergence $1 - \frac{1}{3} + \frac{1}{2} - \frac{1}{3^3} + \frac{1}{2^2} - \frac{1}{3^5} + \frac{1}{2^3} - \cdots$ 5M

(P.T.O..)

13. B).   What can you say about the series $1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots \infty$ 10M

14. A).   If $a < b$, prove that $\frac{b-a}{1+b^2} < tan^{-1}b - tan^{-1}a < \frac{b-a}{1+a^2}$ using Lagrange mean value   10M
          theorem. Hence deduce $\frac{\pi}{4} + \frac{3}{25} < tan^{-1}\frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}$

OR

14. B).   i. Prove that $\beta(m,n) = \beta(m+1,n) + \beta(m,n+1)$ 5M
          ii. Evaluate $\int_0^1 \frac{dx}{\sqrt{-logx}}$ 5M

15. A).   i. Find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}$ if u = f(x+y, x- y)   5M
          ii. Show that the functions u = xy + yz + zx, v = $x^2 + y^2 + z^2$, and w = x + y +z are   5M
          functionally related.

OR

15. B).   Find the dimensions of a rectangular parallelopiped box open at the top of maximum   10M
          capacity whose surface area is 108 sq. inches.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025

Course Name: Engineering Physics

(Common for CE & ME)

Date: 14.07.2025 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.	Define simple harmonic motion and give two examples.	2 M
2.	Differentiate between transverse and longitudinal waves.	2 M
3.	State Huygen's principle and its significance.	2 M
4.	What are Newton's rings, and why are they circular?	2 M
5.	What is meant by the coherence of laser light?	2 M
6.	Define the terms critical angle and total internal reflection.	2 M
7.	Write a short note on Piezo electric materials.	2 M
8.	How are ferrimagnetic materials different from ferromagnetic materials?	2 M
9.	Outline the surface-to-volume ratio.	2 M
10.	Write any four applications of nanomaterials.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Explain forced harmonic oscillations and derive the condition for resonance.	10M
	OR	
11. B).	Explain the formation of standing waves on a string. Discuss the conditions for constructive and destructive interference.	10M
12. A).	What are Newton's rings? Explain how they are formed and derive the formula for the radius of curvature.	10M
	OR	
12. B).	Summarize Fraunhofer diffraction with a single slit.	10M
13. A).	Discuss construction and working of the Helium-Neon laser with neat ELD diagrams.	10M
	OR	
13. B).	What is acceptance angle? Derive the expression for the acceptance angle.	10M
14. A).	Define internal field in solids and compute the local field in solids by using the Lorentz method.	10M
	OR	
14. B).	Explain the hysteresis curve of ferromagnetic materials based on the domain theory of ferromagnetism.	10M
15. A).	With neat diagram explain synthesis of nanoparticles using Sol-Gel process.	10M
	OR	
15. B).	Summarize the functioning of Transmission Electron Microscopy (TEM) and emphasize their significance in studying nanoscale structures.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025

Course Name: Applied Physics

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

Date: 14.07.2025 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.	State Heisenberg's uncertainty principle.	2 M
2.	Write an expression for Fermi distribution function.	2 M
3.	Define extrinsic semiconductor.	2 M
4.	Write applications of Hall effect.	2 M
5.	Write applications of p-n junction diode.	2 M
6.	State Radiative recombination.	2 M
7.	What is population inversion?	2 M
8.	What are different attenuations in optical fiber?	2 M
9.	Define electronic polarization in dielectrics.	2 M
10.	Obtain the value of 1 Bohr magneton for electron.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Explain how Davission and Germer experiment proves the existence of matter wave.	10M
	OR	
11. B).	Derive energy eigen values of particle in one dimensional infinite potential well.	10M
12. A).	Obtain an expression for carrier concentration in n-type extrinsic semiconductor.	10M
	OR	
12. B).	State and explain Hall effect and derive an expression for hall coefficient.	10M
13. A).	Explain the formation, biasing and working of PN junction diode.	10M
	OR	
13. B).	Discuss the construction,working, characteristics and applications of solar cell.	10M
14. A).	With the help of suitable diagram explian construction and working of ruby laser.	10M
	OR	
14. B).	i) Explain the following (a) Total internal reflection (b) Construction of optical fiber.	2M
	ii) Derive the Expression for numerical aperture.	8M
15. A).	i) Express the Clausius-Mosotti equation.	2M
	ii) Derive an expression for local field.	8M
	OR	
15. B).	Classify the magnetic materials on the basis of magnetic moment.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025

Course Name: Engineering Graphics

(Common for CE & ME)

Date: 16.07.2025 AN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE marks.   10x1=10M

1. The curve generated by a point on the circumference of the rolling circle, rolling along another circle outside it, is called a _____   1 M

2. When measurements are desired in the three units, _____ scale is used.   1 M

3. A line AB 30mm long is parallel to both HP and VP. The line is 20mm above HP and 13mm in front of VP. Draw the projections of the line.   1 M

4. A line EF 35mm long is on VP and parallel to HP. The line is 15mm above HP. Draw the projections of the line.   1 M

5. A square pyramid base edge = 75mm and height =100mm is resting on its base on the ground. Draw its top view with re`spect to reference line.   1 M

6. The true shape of the section is an_____, when a cylinder is cut by a section plane, inclined to the axis.   1 M

7. The intersection between a solid body and a straight line is a_____   1 M

8. The line of intersection between cylinder is a _____   1 M

9. The side view of the object is obtained is obtained as a projection on _____ plane.   1 M

10. In first angle projection, top view is _____ the front view with respect to the reference line.   1 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Construct an ellipse when the distance between the focus and the directrix is 50 mm and the eccentricity is 2/3. Also, draw tangent and normal at a point 40 mm from the directrix.   10M

OR

11. B). Construct an epicycloid having a rolling circle of diameter 40 mm for one revolution clock-wise and a directing circle of radius 150 mm. Also draw a tangent and normal at a point 95 mm from the centre of the directing circle.   10M

12. A). Draw the projections of the following points on the same ground line; keeping the distance between the projectors is 50mm, Name the quadrants in which they lie.   10M
   i. Point A, in the HP and 20mm infront of VP.
   ii. Point B, 15mm below the H.P. and 30 mm behind the V.P.
   iii. Point C, 10mm above the H.P. and 20 mm behind the V.P.
   iv. Point D, is on both HP and VP.

OR

12. B). A square ABCD of 50mm side has its corner A in the H.P. Its diagonal AC is inclined at 30° to the H.P and the diagonal BD inclined at 45^0 to the VP and parallel to H.P. Draw its projections.   10M

13. A). A cylinder of base diameter 40 mm and height 80 mm rests on its base on HP. It is cut by   10M
section plane perpendicular to VP and inclined at 45° to HP and passing through the axis
at a distance 40 mm from base. Draw the front view, sectional top view and true shape of
the section.

OR

13. B). A cone of base 80 mm diameter and height 100 mm lies with one of its generators on HP   10M
and the axis appears to be inclined to VP at an angle of 40° in the top view. Draw its top
and front views.

14. A). A square prism of base 50 mm side and height 125 mm stands on the ground with its side   10M
of base while the faces of the prism are equally inclined to the V.P. It is penetrated by a
cylinder of diameter 40 mm and axis 125 mm long. The axis of the cylinder is parallel to
both HP and VP and bisects the axis of the prism. Draw the projection showing fully the
curves of intersection.

OR

14. B). A pentagonal pyramid side of base 30 mm and height 60 mm stands with its base on HP   10M
and an edge of the base is parallel to VP and nearer to it. It is cut by a plane perpendicular
to VP, inclined at 40° to HP and passing through a point on the axis 32 mm above the
base. Draw the develop the lateral surface of the truncated pyramid.

15. A). Construct the front view, top view and left side view of the below isometric view.   10M
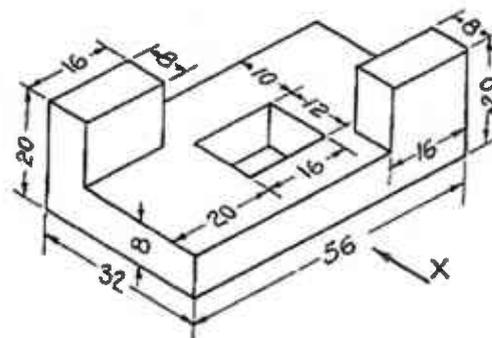
OR

15. B). Construct the isometric view to the given below orthographic view.   10M
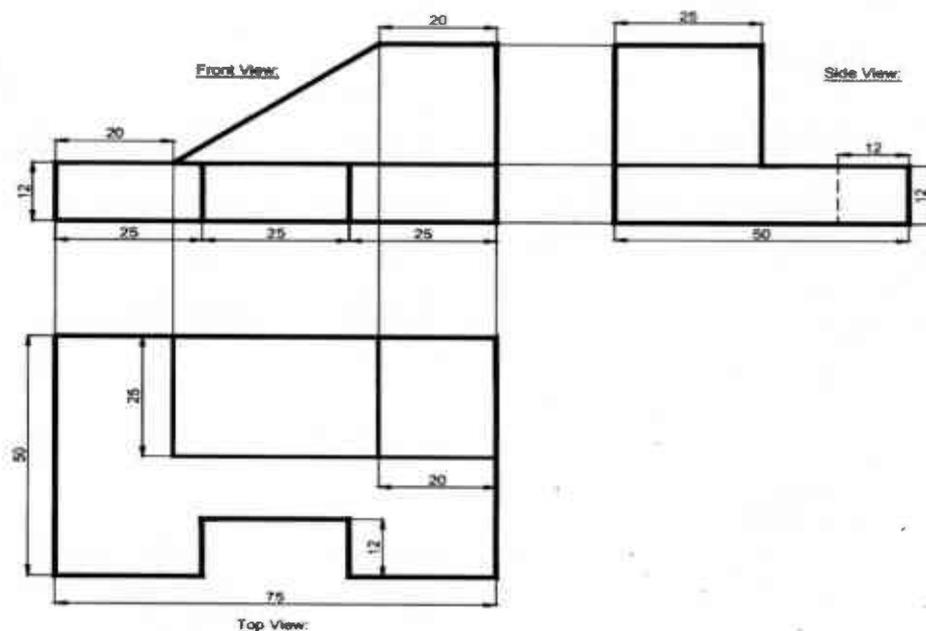
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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025

Course Name: Programming for Problem Solving

(Common for EEE, ECE, CSE, IT, CSC, CSM, CSD, AID & AIM)

Date: 16.07.2025 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 object code and executable code.	2 M
2.	List the rules for naming identifiers in C.	2 M
3.	What does the continue statement do in a loop?	2 M
4.	How does a switch statement differ from an if-else chain?	2 M
5.	Explain the purpose of the static storage class in C.?	2 M
6.	What are automatic variables in C? Where are they stored?	2 M
7.	Define dynamic memory allocation. Name two functions used for it in C.	2 M
8.	Write the syntax to pass a pointer to a function.	2 M
9.	What is the difference between formatted and unformatted data files?	2 M
10.	Mention any two file modes used in fopen().	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) What is a flowchart? Draw a flowchart to find the largest of two numbers?   5M

ii) Explain the use of getchar() and putchar() functions with a sample? program.?   5M

OR

11. B). i) What are unary and bitwise operators? Give syntax and examples for each?   5M

ii) Write a C program using the conditional (?:) operator to check if a number is even or odd.   5M

12. A). i) Write a program using for loop to display the multiplication table of a given number.?   5M

ii) Write a program using continue to skip even numbers in a loop.?   5M

OR

12. B). What are arrays? Explain how to define and process a multidimensional array with a program that initializes a 3x3 matrix and prints its elements.   10M

13. A). Write a C program to demonstrate recursion by calculating the Fibonacci series up to n terms. Explain how recursion works in this context.   10M

OR

13. B). What are multi-file programs in C? Explain how to create a multi-file program with a header file, a source file for function definitions, and a main file. Provide a complete example that calculates the area of a circle.?   10M

(P.T.O..)

14. A). Define a structure to store employee details (ID, name, salary). Write a program to input 10M
details of 3 employees, pass the structure array to a function, and display the employee
with the highest salary.

OR

14. B). i) Differentiate between structures and unions. Provide syntax and memory usage 5M
comparison.

ii) Write a C program to demonstrate structure with pointers. 5M

15. A). i) Explain the algorithm of Selection Sort with a trace for an array. 5M

ii) Compare and analyze the time complexities of all three sorting techniques 5M

OR

15. B). Discuss file handling in C, including opening, closing, reading, and writing to a file. Write 10M
a program to store student records (name, roll number) in a file and then read and display
them.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025
Course Name: Engineering Mechanics
(Common for CE & ME)

Date: 18.07.2025 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.	What is triangle law of force?	2 M
2.	State and explain Lami's theorem.	2 M
3.	What forces are involved in ladder wall application if the wall is rough?	2 M
4.	What does the second theorem of pappus indicate?	2 M
5.	What is the moment of inertia of a sphere?	2 M
6.	What is the mass moment of inertia of a hollow cylinder with outer radius, inner radius and length as R, r and L respectively?	2 M
7.	State work-energy principle for Linear and angular motion of a rigid body.	2 M
8.	State the law of conservation of momentum.	2 M
9.	What is the principle of conservation of energy?	2 M
10.	Explain D Alemberts principle.	2 M

PART-B
#### Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Figure shows the body under the action of coplanar forces. Determine the magnitude, direction and position of the single force which will keep the body in equilibrium.   10M
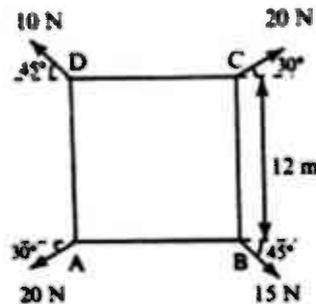
11. B). A circular roller of weight 1000 N and radius 20 cm hangs by a tie rod AB = 40 cm and rests against a smooth vertical wall at C as shown in figure. Determine the tension in the rod and reaction at point C.   10M
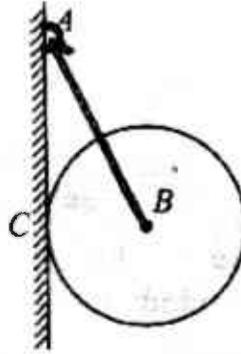
12. A). Determine the least value of P to cause motion to impend rightwards shown in figure. Assume the pulley to be frictionless and coefficient of friction of all contiguous surfaces is 0.15.   10M
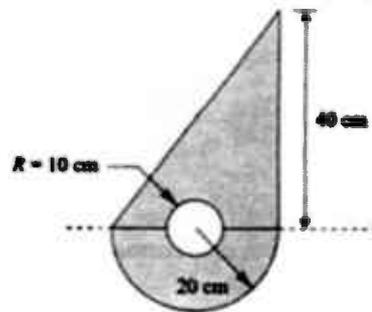
OR

12. B).   10M
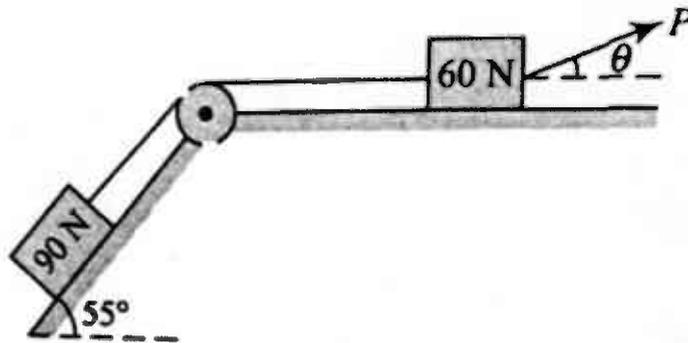
Three plates ABC and BCDE and DEF are welded together as shown in figure 4. Circle of diameter 1.5 m is cut from the composite plate. Determine the centroid of the remaining area.
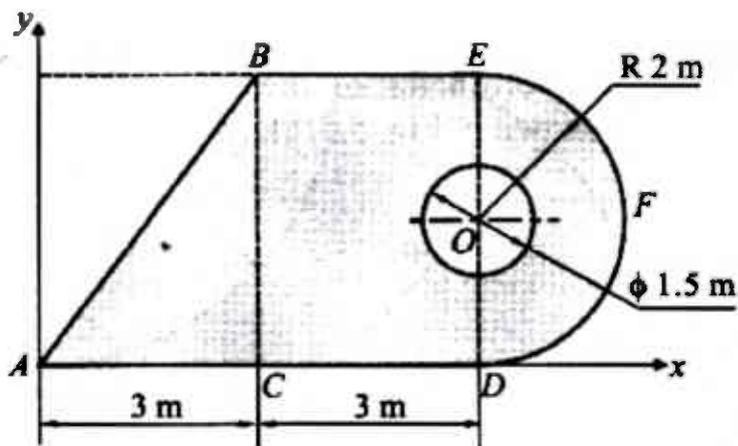
(P.T.O..)

13. A). Find the moments of inertia of the shaded area, shown in figure, about its centroidal axes.   10M

OR

13. B). Determine the mass moment of inertia of a solid cone of height "h" and base radius "r"   10M
about its axis of rotation.

14. A). A car accelerates uniformly from a speed of 30 Km/Hr to a speed of 75 Km/Hr in 5 secs.   10M
Determine the acceleration of the car and the distance traveled by the car during 5 secs.

OR

14. B). Establish the work – energy equation for translation.   10M

15. A). A vehicle accelerates a glider of 125 kg mass from rest to a speed of 50 km/hr. Make   10M
calculations for the work done on the glider by the vehicle. What change would occur in
the kinetic energy of the glider if subsequently its velocity reduces to 20 km/hr on the
application of brakes?

OR

15. B). A stone is dropped into a well and falls vertically with constant acceleration g =9.81 m/s2.   10M
The sound of impact of the stone on the bottom of the well is heard 6.5 sec after it is
dropped. If the velocity of sound is 340 m/s, find the depth of the well.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025

Course Name: Engineering Chemistry

(Common for ECE, CSE, IT & CSD)

Date: 18.07.2025 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.	What are bonding and anti-bonding molecular orbitals?	2 M
2.	Discuss the magnetic nature of nitrogen and flourine molecules by mentioning the reason.	2 M
3.	Draw a neat sketch of a galvanic cell with proper labeling.	2 M
4.	Explain why pure copper rod is used in electroplating of copper.	2 M
5.	What is the importance of the fingerprint region in IR spectroscopy?	2 M
6.	Explain how you can distinguish between benzene and anthracene using UV-Visible spectroscopy.	2 M
7.	Convert 76 ppm of hardness into degree clark and degree french.	2 M
8.	Explain the principle of reverse osmosis for the desalination of water.	2 M
9.	What is Markownikoff's rule? Explain by giving a suitable example.	2 M
10.	Which is the best reducing agent for the reduction of (i) acetone, (ii) ester?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A).	Give the Molecular Orbital diagram of O_2 with proper labelling of the orbitals.	10M
	OR	
11. B).	Explain the crystal field splitting of d-orbitals by the ligands in octahedral complexes with a coordination number 6.	10M
12. A).	What are the different types of fuel cells available? Discuss the principle involved in the working of a hydrogen-oxygen fuel cell.	10M
	OR	
12. B).	(i) What is the Pilling-Bedworth rule? How it is useful to determine the nature of metal oxide layer.	5M
	(ii) Differentiate between Galvanic series and Electrochemical series.	5M
13. A).	What is meant by the term chemical shift? Discuss the various factors that affect the chemical shift of protons. Give suitable examples.	10M
	OR	
13. B).	Explain the proton NMR spectrum of the CH_3CH_2OH molecule and write the applications of NMR spectroscopy.	10M

(P.T.O..)

14. A). Define desalination. Explain briefly the different methods used for the desalination of   10M
brackish water.

OR

14. B). Describe the principle and procedure involved in the zeolite process for the treatment of   10M
water. What are the advantages and disadvantages of the process?

15. A). Explain S_N1 and S_N2 mechanisms for nucleophilic substitution reactions. Discuss their   10M
stereochemical implications.

OR

15. B). (a)Discuss the conformational isomers of *n*-butane. (b) Draw the potential energy diagram   3M
for various conformations of *n*-butane and explain their order of stability.   7M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech I Semester Supplementary Examinations July-2025

Course Name: Engineering Drawing

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

Date: 18.07.2025 AN   Time: 3 hours   Max.Marks: 60

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries ONE marks.   **10x1=10M**

1.	Mention two practical applications of the cycloids.	1 M
2.	Define eccentricity.	1 M
3.	State the position of the point, the top view of which lies 40 mm above the reference line and the front view 60 mm below it.	1 M
4.	Draw the projection of line AB = 60 mm long lies in the HP and 45 mm in front of VP.	1 M
5.	Differentiate the diagrams of hexagonal pyramid and hexagonal prism.	1 M
6.	An equilateral triangle of size 50 mm is parallel to and 20 mm in front of the VP. What is its shape in the front view?	1 M
7.	Distinguish between frustum and truncated cone.	1 M
8.	How many numbers of triangular faces exist in a triangular pyramid?	1 M
9.	A sphere is placed on a cube. What is the shape of the sphere in isometric view?	1 M
10.	Name the method of drawing a circle in an isometric projection.	1 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A). The vertex of hyperbola is 65 mm from its focus. Draw the curve if the eccentricity is 3/2. Draw a tangent and normal at a point on the curve 75 mm from the directrix.   10M

OR

11. B). A circle having a 50 mm diameter rolls within a circle with a 150 mm diameter with internal contact. Draw the locus of a point lying on the circumference of the rolling circle for its complete turn. Name the curve. Also draw a tangent and a normal to the curve, at a point that is 40 mm from the center of the bigger circle.   10M

12. A). The top view of a 75mm long line CD measures 50mm and front view 60mm respectively. Its end C is 20 mm in above H.P. and 15mm in front of V.P. Draw the projections and Find the true inclinations.   10M

OR

12. B). A regular pentagon of 30 mm sides is resting on HP on one of its sides with its surface 45^0 inclined to HP. Draw its projections when the side in HP makes 30^0 angle with VP.   10M

13. A). Draw the projections of a cube with 45 mm edges, resting on one of its corners in the H.P., with a solid diagonal vertical.   10M

(P.T.O..)

13. B). A square prism, having a base with 30mm side and a 70mm long axis, is resting on one of   10M
its base edges in the H.P. Its axis is inclined at 30^0 to H.P and the resting edge is inclined
45^0 to V.P. Draw its projections.

14. A). Construct an isometric view of frustum of cone having 40 mm base diameter and 20 mm   10M
diameter on its top side with 60 mm long axis, resting on its base on the H.P.

OR

14. B). Sketch the isometric view of a cylinder of base diameter 50 mm and axis length 70 mm   10M
when the axis of the cylinder is (i) vertical (ii) horizontal.

15. A). Show the front view, top view of a given orthogonal object shown in figure. All   10M
dimensions are in mm.

OR

15. B). Prepare the isometric view for a given orthogonal view as shown in the figure. All   10M
dimensions are in mm.

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