CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations December-2025
Course Name: ODEs and Multivariable Calculus
(Common for all Branches)

Date: 30.12.2025 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.	Solve $ydx - xdy = a(x^2 + y^2)dx$	2 M
2.	State Newton's law of cooling.	2 M
3.	Solve $(D^2 + 2D + 1)y = e^{-x}$	2 M
4.	Define wronskian of two functions and give an example.	2 M
5.	Find the limits after changing the order of integration $\int_0^b \int_0^{\frac{a}{b}\sqrt{b^2-y^2}} f(x,y)dxdy$.	2 M
6.	Using triple integral, find the volume of a rectangular box whose length is 6 feet, breadth is 5 and height is 4 feet.	2 M
7.	Find a unit normal vector to the surface $z = x^2 + y^2$ at $(-1, -2, 5)$.	2 M
8.	If $\vec{F} = y(ax^2 + z)\vec{i} + x(y^2 - z^2)\vec{j} + 2xy(z - xy)\vec{k}$ is solenoidal then find a.	2 M
9.	State Stroke's theorem.	2 M
10.	Evaluate $\int_c F . dr$ where $\vec{F} = x^2i + y^2j$ and the curve $y = x^2$ in the xy- plane from $(0, 0)$ to $(1,1)$.	2 M

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

11.A).	i) Solve $(1 + y^2)dx = (tan^{-1}y - x)dy$	5M
	ii) Solve $xp^2 - 2yp + ax = 0$.	5M

OR

11. B).	The temperature of the surrounding air is 20°C. The temperature of a hot body reduces from 100°C to 80°C in 10 minutes. What will be the temperature of the body after 20 Minutes? When will be the temperature 40°C?	10M

12. A).	Solve the differential equation $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 8e^{2x}\sin 2x$.	10M

OR

12. B).	Solve $(D^2 + 4)y = tan2x$ by variation of parameters.	10M

13. A).	Change the order of integration in $\int_0^1 \int_{x^2}^{2-x} x\,y\,dxdy$ and hence evaluate the same.	10M

OR

13. B).	Evaluate $\iiint_V d\,xdydz$ where V the finite region of space is formed by the planes $x = 0, y = 0, z = 0$ and $2x + 3y + 4z = 12$.	10M

14. A).	Show that $\nabla^2[f(r)] = f''(r) + \frac{2}{r}f'(r)$ where $r = |\vec{r}|$.	10M

OR

14. B).	Find constants a, b, c so that the vectors $\vec{A} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2z)\vec{k}$ is irrotational. Also find ϕ such that $\vec{A} = \nabla\phi$.	10M

(P.T.O..)

15. A). Verify Stoke's theorem for $\bar{F} = y^2 i - 2xy j$ taken round the rectangular bounded by $x = \pm b, y = 0, y = a$.   10M

OR

15. B). Use divergence theorem to evaluate $\iint (xi + yj + z^2 k).nds$ where S is the surface bounded by the cone $x^2 + y^2 = z^2$ in the plane $z = 4$.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations January-2026
Course Name: Engineering Chemistry
(Common for CE, EEE, ME, CSC, CSM, AID& AIM)

Date: 03.01.2026 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.	Write about LCAO.	2 M
2.	Draw the structures of Benzene and Butadiene.	2 M
3.	What is Electrode potential and Standard Electrode Potential?	2 M
4.	Define Tinning and Galvanizing.	2 M
5.	Mention any 4 applications of IR spectra.	2 M
6.	Write a short note on MRI.	2 M
7.	Define Permanent Hardness. What are the units of Hardness?	2 M
8.	What is Reverse Osmosis and Electro-Dialysis?	2 M
9.	What are Optical Isomers?	2 M
10.	Write any two applications of Paracetamol and Ibuprofen.	2 M

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

11.A).	Draw the Molecular orbital energy level diagrams of diatomic molecule O_2.	10M
	OR	
11. B).	Explain the Crystal field splitting of transition metal ion d- orbital in Octahedral complexes.	10M
12. A).	Explain the Construction, working and applications of Hydrogen-Oxygen Fuel cells.	10M
	OR	
12. B).	What is Cathodic Protection? Explain Sacrificial Anodic method.	10M
13. A).	Explain the vibrational modes and applications of IR spectroscopy.	10M
	OR	
13. B).	Describe the principle and different electronic transitions of electronic spectroscopy.	10M
14. A).	Explain Softening of water by Zeolite process.	10M
	OR	
14. B).	Discuss the Boiler Troubles: i) Scales and Sludges, ii) Caustic Embrittlement and iii) Boiler Corrosion.	10M
15. A).	Discuss the different Conformational isomers of n- butane.	10M
	OR	
15. B).	Write a brief note on Mechanism of Nucleophilic Substitution reactions.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations January-2026
Course Name: Applied Physics
(Common for ECE, CSE, IT & CSD)

Date: 03.01.2026 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 uncertainty principle.	2 M
2.	What is the Bose-Einstein function?	2 M
3.	What is the bandgap and mention bandgap value of Si?	2 M
4.	Give the list of N-type dopants.	2 M
5.	Draw the circuit diagram of the forward bias of PN junction diode.	2 M
6.	What is the non-radiative recombination?	2 M
7.	Mention any two characteristics of Laser.	2 M
8.	Write the conditions of total internal reflection.	2 M
9.	Define the displacement vector.	2 M
10.	Give examples of pyroelectric materials.	2 M

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

11.A).	Show that the energy of the particle in a 1-D box is quantized.	10M
	OR	
11. B).	Derive the density of energy states available in solids.	10M
12. A).	Calculate the number of electrons in the conduction band of the intrinsic semiconductor.	10M
	OR	
12. B).	Calculate the carrier concentration of holes in the p-type semiconductor.	10M
13. A).	How Zener diode is different from PN junction formed and explain the V-I characteristics of Zener diode.	10M
	OR	
13. B).	Discuss the construction and working of LED.	10M
14. A).	Explain the construction and working of He-Ne laser.	10M
	OR	
14. B).	Mention differences between step-index and graded-index optical fibers.	10M
15. A).	Explain the different types of polarizations.	10M
	OR	
15. B).	Explain the different types of magnetic materials.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations January-2026

Course Name: Programming for Problem Solving
(Common for CE & ME)

Date: 06.01.2026 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

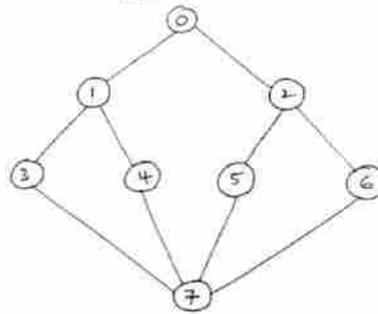|		
1.	Define identifiers and keywords.	2 M
2.	What is an algorithm?	2 M
3.	Interpret do-while loop statement.	2 M
4.	Infer the break statement.	2 M
5.	What is Recursion? Write the advantages of Recursion.	2 M
6.	Compare static variable with register variable.	2 M
7.	Write about the differences between Structure and Union.	2 M
8.	Define self-referential structures with an example.	2 M
9.	Write the syntax of fopen() and explain it.	2 M
10.	Write the differences between linear and binary search.	2 M

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

11.A). Demonstrate the following terms Syntax, Semantics, Constants, Variables, and Data Types.   10M

OR

11. B). Define Type Conversion and show Precedence and Associativity with example.   10M

12. A). Write a program to print first 7 prime numbers by using while loop control statement.   10M

OR

12. B). Develop the Matrix multiplication program by using 2-Dimensional Arrays.   10M

13. A). List any five string handling functions and explain them.   10M

OR

13. B). Explain various categories of functions with examples.   10M

14. A). Write C program to define a student structure with the members STU_RNO, STU_NAME and STU_MARKS, initialize and display the members by using pointer structure variable.   10M

OR

14. B). Define pointer and show the passing pointers to functions.   10M

15. A). Explain clearly about following terms: 10M
i) fseek   ii) ftell   iii) rewind   iv) ferror   v) feof

OR

15. B). Explain Insertion sort and Bubble Sort algorithms with example.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations January-2026

Course Name: Data Structures & Algorithms

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

Date: 06.01.2026 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.	Write a function that counts the number of nodes in a list.	2 M
2.	Write a function that deletes a node containing a number, *num*, from a circularly linked list.	2 M
3.	Give a function to add an item to a stack.	2 M
4.	Write the postfix form of the expression $a * - b + c$	2 M
5.	Give any two representations of a tree.	2 M
6.	What is the maximum number of nodes in a binary tree of depth k?	2 M
7.	For the diagram given below, write its adjacency-matrix.	2 M

8.	Define the loading factor of a hash table.	2 M
9.	Write the time taken by the quicksort when the input file is already in sorted order.	2 M
10.	Write the worst and average time complexities of the KMP algorithm.	2 M

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

11.A). Write functions for the operations traversing, searching, insertion, deletion and reverse of singly linked list.   10M

OR

11. B). Write a function to concatenate two circular lists together. Assume that the pointer to each such list points to the last node. Your function should return a pointer to the last node of the concatenated circular list. Following the concatenation, the input lists do not exist independently. What is the time complexity of your function?   10M

12. A). (i) Define the stack ADT.   5M
(ii) Translate the expression $(a + b) * d + e/(f + a * d) + c$ to postfix one using stack.   5M

OR

12. B). (i) Implement the *queueFull* and *queueEmpty* functions for the noncircular queue.   5M
(ii) Implement the *queueFull* and *queueEmpty* functions for the circular queue.   5M

13. A). Write out the inorder, preorder and postorder traversals for the binary trees.   10M

OR

13. B). Write an algorithm to list the elements of an AVL tree T in ascending order of key. Show that this can be done in O(n) time if T has n nodes.   10M

(P.T.O..)

14. A). Write the depth first search (dfs) algorithm, derive the time complexity function for dfs 10M
and trace the algorithm for the following graph.

OR

14. B). Define Collision. Explain quadratic probing and double hashing with suitable examples. 10M

15. A). Write the quick sort algorithm and using it sort the list 10M
(12, 2, 16, 30, 8, 28, 4, 10, 20, 6, 18).

OR

15. B). Write the heap sort function using two for loops. Write the status of the list 10M
(12, 2, 16, 30, 8, 28, 4, 10, 20, 6, 18) at the end of the first for loop as well as at the end of
each iteration of the second for loop of heap sort.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations January-2026
Course Name: English
(Common for CE, EEE, ME, CSC, CSM, AID & AIM)

Date: 08.01.2026 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. **Fill in the blanks with appropriate prepositions.**   2 M
   i) She was relieved ___ the pain after the effect of medicines.
          a. off   b. from   c. of   d. with
   ii) The manager has no supportive facts to speak _____
          a. on   b. of   c. for   d. about

2. What is the difference between a clause and a sentence?   2 M

3. **Fill in the article a, an or the where necessary. Choose x where no article is used.**   2 M
   i) This is _____ university.
   ii) Krishna went to_____ rescue of Arjuna.

4. **Punctuate the following sentence.**   2 M
   i) he got what he worked for a promotion.
   ii) youre responsible for your belongings.

5. Write two principles of good writing.   2 M

6. **Correct the following sentences:**   2 M
   i) Harry **wants** to show his friends the photos he **take** last summer.
   ii) Scientists **predict** that the sun **die** in the distant future.

7. **Write a synonym and an antonym each for the following words.**   2 M
   i) adept   ii) robust

8. What was the contribution of Yunus during Bangladesh Liberation War?   2 M

9. **Avoid redundancy in the following sentences.**   2 M
   i) Mahesh went to the railway station to make advance reservation to Bangalore.
   ii) In the meeting the final decision was taken by the principal.

10. **Identify the following abbreviations and give their full forms.**   2 M
    i) VAT   ii) RSVP

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

11.A). What is the author's attitude towards how one should behave with other people? Do you agree with his reasoning? Give reasons for your answer.   10M

OR

11. B). **i) Fill in the blanks with appropriate prepositions.**   5M
   a) I didn't see you .... the party on Saturday. Where were you?
   b) Paris is .... the river Seine.
   c) Shall we travel .... your car or mine?
   d) I haven't seen Kate for some time. I last saw her .... Dave's wedding.
   e) What time do you usually arrive .... work in the morning?

(P.T.O..)

ii) Change the sentences as directed. 5M
    a) Even though it was late, she continued to work. (change it into compound sentence)
    b) You need to practice more, or you won't perform well. (change it into complex sentence)
    c) Because of the new policies, they had to work overtime. (change it into compound sentence)
    d) He is unwell, yet he helps his sister with her homework. (change it into complex sentence)
    e) If you don't go now, you'll miss the train. (Change into a simple sentence)

12. A). Tennyson imagines what it would be like a book, or stream, running down the mountainside and across country until it joins a river. Discuss it with necessary supporting details. 10M

OR

12. B). How did George Bernard Shaw become a great orator. Explain with reference to the lesson 'How I Became a Public Speaker.' 10M

13. A). **Fill in the blanks with appropriate verbs (singular or plural).** 10M
    a) The formation of paragraphs .... very important.
    b) Man's happiness or misery .... in a great measure in his own hands.
    c) The police .... investigating the murder.
    d) 40% of the people .... support the new law.
    e) 40% of the country .... support the new law.
    f) Carlos is the only one of those students who .... lived up to the potential described in the yearbook.
    g) Politics .... sometimes a dirty business.
    h) To an outsider, the economics of this country .... to be in disarray.
    i) Not only the students but also their instructor .... been called to the principal's office.
    j) Each and every student and instructor in this building .... for a new facility by next year.

OR

13. B). Write any five principles of good writing. 10M

14. A). How did Grameen Bank change the lives of Bangladesh poor women? 10M

OR

14. B). **Write a short essay on the topic 'Can online hate speech be stopped without limiting freedom of expression?' Substantiate your argument(s) with facts, reasons and examples. Introduce paragraphs, wherever necessary.** 10M
(Hate speech is "public speech that expresses hate or encourages violence towards a person or group based on something such as race, religion, sex, or sexual orientation." – Cambridge Dictionary)

15. A). The author says political language is designed to twist meaning. Do you agree with this statement? Substantiate your answer with examples. 10M

OR

15. B). **Summarize the following article in about 75 words.** 10M
Researchers in France and the United States have recently reported that baboons are able to think abstractly. It has been known for some time that chimpanzees are capable of abstract thought, but baboons are a more distant relation to mankind. In the experiment, scientists trained two baboons to use a personal computer and a joystick. The animals had to match computer designs which were basically the same but had superficial differences. In the experiment, the baboons performed better than would be expected by chance. The researchers describe their study in an article in the *Journal of Experimental Psychology*.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech II Semester Supplementary Examinations January-2026

Course Name: Engineering Drawing
(Common for ECE, CSE, IT & CSD)

Date: 08.01.2026 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.	Define the eccentricity of a conic section.	1 M
2.	What is the cycloidal curve?	1 M
3.	What is the difference between First & Third angle projections?	1 M
4.	When will be the T.V & F.V lengths are same as true length of a line?	1 M
5.	Define the Orthographic projection.	1 M
6.	Differentiate Prism and Pyramid.	1 M
7.	Show the isometric scale of projection.	1 M
8.	Draw the isometric projection of a pentagon of side length 30mm with its surface is parallel to V.P.	1 M
9.	Differentiate between Isometric projection and Isometric view.	1 M
10.	Draw 3-orthographic views of a cube of side 30mm.	1 M

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

11.A). A fixed point is 75 mm from a fixed straight line. Draw the locus of a point *P* moving such a way that its distance from the fixed straight line is half of its distance from the fixed point. — 10M

OR

11. B). A circle of 50 mm diameter rolls one revolution on another circle of 175 mm diameter. Draw and name the curves traced by a point 'P' on the rolling circle. — 10M

12. A). The front view of a line, inclined at 30° to the V.P is 65 mm long. Draw the projections of the line and find its true length, when it is parallel to and 40 mm above the H.P., its one end being 30 mm in front of the V.P. — 10M

OR

12. B). A line AB, 65 mm long has its end A 20 mm above the H.P. and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and show its inclinations with the H.P. and the V.P. — 10M

13. A). A pentagonal pyramid, base 25 mm side and axis 50 mm long has one of its triangular faces in the V.P. Draw its projections. — 10M

OR

13. B). A square prism, base 40 mm side and height 65 mm, has its axis inclined at 45° to the H.P. and has an edge of its base, on the H.P and inclined at 30° to the V.P. Draw its projections. — 10M

(P.T.O..)

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

OR

14. B). Draw an isometric view of a frustum of cone of axis 70mm long, bottom & upper base 10M
    diameters are 60mm & 40mm respectively, when its axis is perpendicular to H.P.

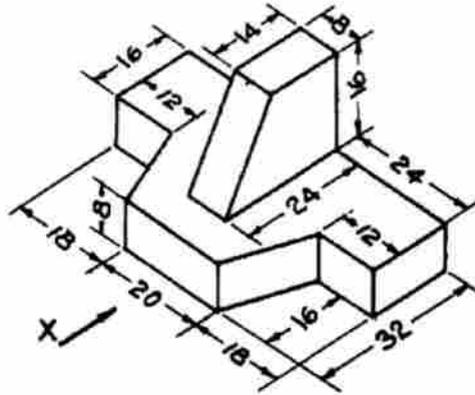15. A). Show the front, top and side views of the fig.1 shown below. All dimensions are in mm. 10M

Fig.1

OR

15. B). Draw the isometric view of the model of steps, two views of which are shown in Fig.2. 10M
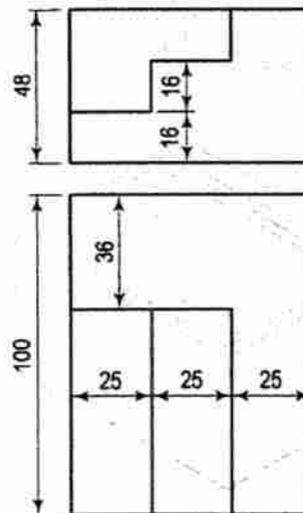   All dimensions are in mm.

Fig.2

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