H.T No: | | | | | | | | | | | R22

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **B.Tech I Semester Supplementary Examinations July-2025**
Course Name : **Matrices and Calculus**
Course Code : **A400001**
Branch : **CE, EEE, ME, ECE, CSE, IT, CSC, CSM, CSD & AIM**
Date & Session : **11-07-2025 AN** **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. Define symmetric, skew-symmetric matrix. 1 M
2. Find the Rank of the following matrix. 1 M
$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}$
3. State Cayley-Hamilton theorem. 1 M
4. If $A = \begin{bmatrix} 2 & 4 \\ 3 & 1 \end{bmatrix}$ then eigen values of 2A 1 M
5. State Rolle's theorem. 1 M
6. Define Beta Function. 1 M
7. Define Homogenous functions. 1 M
8. Write $J\left(\frac{u,v,w}{x,y,z}\right) =$ 1 M
9. Evaluate $\int_0^2 \int_0^3 xdxdy$. 1 M
10. Evaluate $\int_0^2 \int_1^2 \int_2^3 dxdydz$. 1 M

PART-B

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

11.A). Determine the Rank of the following matrix by reducing to Echelon form $\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$. 10M

OR

11. B). Using Gauss Elimination method solve the following system of equations. 10M
$3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4$.

12. A). Find the characteristic roots and characteristic vectors for $A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ 10M

(P.T.O.)

OR

12. B). Diagonalize the matrix by orthogonalization to the matrix $A=\begin{pmatrix}3 & 1 & 1\\ 1 & 3 & -1\\ 1 & -1 & 3\end{pmatrix}$ 10M

13. A). Prove that $\frac{\pi}{4}+\frac{3}{25}<\tan^{-1}\left(\frac{4}{3}\right)<\frac{\pi}{4}+\frac{1}{6}$ 10M

OR

13. B). Prove that $\beta(m,n)=\frac{\sqrt{m}\sqrt{n}}{\sqrt{m+n}}$. 10M

14. A). Show that $u=xe^{y}\sin z, v=xe^{y}\cos z, w=x^{2}e^{2y}$ functionally dependent, hence find the relation. 10M

OR

14. B). Discuss the maxima and minima $f(x,y)=x^{3}+y^{3}-3axy$. 10M

15. A). Evaluate $\iint ydxdy$ where R is the region bounded by the Parabolas $y^2 = 4x$ and $x^2 = 4y$. 10M

OR

15. B). Evaluate $\iiint xy^{2}zdxdydz$ taken through the positive octant of the sphere $x^{2}+y^{2}+z^{2}=a^{2}$ 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech I Semester Supplementary Examinations July-2025**
Course Name : **Applied Physics**
Course Code : **A400008**
Branch : **CE, ME, CSC, CSM, CSD & AIM**
Date & Session : **14-07-2025 AN** **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.	State Heisenberg's uncertainty principle.	1 M
2.	Calculate the minimum energy of an electron confined in a 1D potential box of length 1.2 A°.	1 M
3.	Show the variation of Fermi level with temperature in intrinsic semiconductor.	1 M
4.	Write any two differences between direct and indirect band gap semiconductors.	1 M
5.	What is population inversion in lasers?	1 M
6.	Write any two advantages of optical fibers over copper transmission lines.	1 M
7.	Define dielectric constant & electric polarization.	1 M
8.	Mention any two applications of multiferroics.	1 M
9.	Define superionic conductor.	1 M
10.	What is the significance of surface to volume ratio in nanomaterials?	1 M

PART-B

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

11.A).	Describe Davisson and Germer experiment to verify the existence of matter waves.	10M
	OR	
11. B).	Explain Kronig-Penny model for the motion of an electron in periodic potential.	10M
12. A).	What is Hall effect? Derive the expression for Hall coefficient and write any two applications of Hall effect.	10M
	OR	
12. B).	Explain the construction and working of Light Emitting Diode with neat diagrams.	10M
13. A).	Explain the construction and working of He-Ne laser with relevant diagrams.	10M
	OR	
13. B).	Define acceptance angle and numerical aperture. Derive the expression for acceptance angle.	10M
14. A).	Derive the expression for local field or internal field in dielectrics.	10M
	OR	
14. B).	Describe the hysteresis behavior of magnetic materials and differentiate between soft and hard magnetic materials.	10M
15. A).	Explain the construction and working principle of rechargeable ion batteries.	10M
	OR	
15. B).	Explain the construction and working principle of Scanning Electron Microscope (SEM) to characterize the Nanomaterials.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	**B.Tech I Semester Supplementary Examinations July-2025**	
Course Name	:	**Engineering Chemistry**	
Course Code	:	**A400009**	
Branch	:	**EEE, ECE, CSE & IT**	
Date & Session	:	**14-07-2025 AN**	**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 is electrochemical cell and give example?	1 M
2.	What is pilling Bedworth rule?	1 M
3.	Write the monomers of nylon 6:6.	1 M
4.	What is vulcanization process?	1 M
5.	What is HCV and Mention its units?	1 M
6.	Write the composition of natural gas.	1 M
7.	Define priming and foaming.	1 M
8.	Mention the units of hardness.	1 M
9.	Define cement.	1 M
10.	What is cloud point?	1 M

PART-B

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

11.A).	What is fuel cell? Explain the construction and working of H2-O2 fuel cell.	10M
	OR	
11. B).	Describe the factors influencing the rate of corrosion i) nature of metal ii) nature of corroding environment.	10M
12. A).	Write the preparation, properties and applications of Bakelite.	10M
	OR	
12. B).	What are conducting polymers & explain the mechanism of conduction of polyacetylene?	10M
13. A).	Explain the manufacture of synthetic petrol by Fischer-Tropsch process.	10M
	OR	
13. B).	Write a short note: on i) octane number ii) cetane number	10M
14. A).	Estimation of temporary, permanent and total hardness of water by EDTA method.	10M
	OR	
14. B).	Explain the external treatment of water by ion exchange process.	10M
15. A).	i) Explain glass transition temperature. ii) Explain the psycho chemical characteristics of glass.	5M 5M
	OR	
15. B).	What is setting and hardening of cement? Mention the various reactions involved.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **B.Tech I Semester Supplementary Examinations July-2025**
Course Name : **Electrical Circuit Analysis-I**
Course Code : **A402202**
Branch : **Electrical & Electronics Engineering**
Date & Session : **16-07-2025 AN** **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**

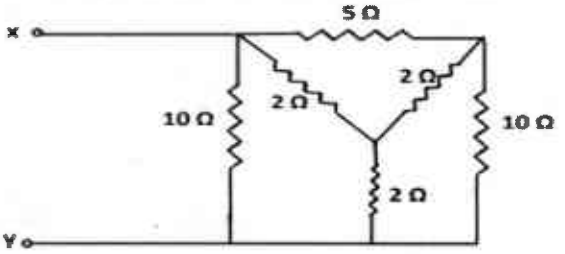
1. Express the relation between voltage and current in a capacitive element. 1 M
2. Distinguish between active & passive elements. 1 M
3. How the RLC series circuit behaves for the frequencies above and below resonant frequencies? 1 M
4. Define RMS value & average value for a sine wave. 1 M
5. What is the use of compensation theorem? 1 M
6. State Superposition theorem. 1 M
7. Give the expressions for active and reactive power in a star connected 3-phase system. 1 M
8. Express the relation between line and phase currents in a star and delta connected three phase circuits. 1 M
9. Give the expression for the total inductance in series aiding connection. 1 M
10. Define Cut set. 1 M

PART-B

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

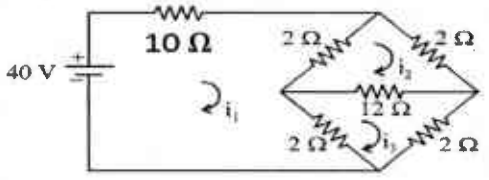
11.A). i) Derive an expression for energy stored in an inductor. 5M

ii) Determine the equivalent resistance between terminals x-y in the resistance network shown in figure given below by make use of Y-Δ transformation. 5M



OR

11. B). Solve loop currents by the mesh current method and also 10M
i) calculate the current flow through 10 Ω resistor
ii) calculate the power dissipated in 12 Ω resistor



(P.T.O..)

12. A). i) The Q-factor of a RLC circuit is 5 at its resonance frequency of 1 kHz. Assuming the power dissipation of 250 W, when the current drawn is 1 A, find the circuit parameters. Determine the Band Width of the circuit. 5M

ii) Derive the quality factor of a parallel RLC circuit at resonance. 5M

OR

12. B). Briefly explain the procedure for drawing the locus diagram for a RL network with i) fixed R and variable L ii) fixed L and variable R. 10M

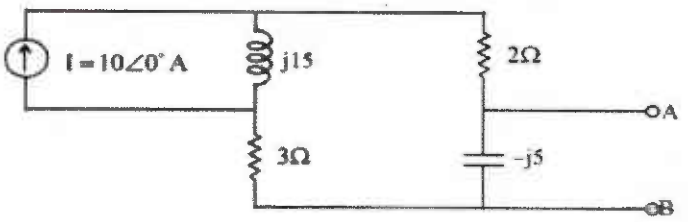
13. A). i) State and explain Maximum Power Transfer theorem and derive the condition for Maximum Power transfer from source to load 6M

ii) Assess that the efficiency is 50% during maximum power transfer condition. 4M

OR

13. B). i) State & Explain Milliman's theorem. 5M

ii) Obtain Norton's equivalent across terminals A and B for the network shown below: 5M



14. A). Explain with neat circuit how the power in a three phase start connected system can be measured by means of two wattmeter method. 10M

OR

14. B). i) Prove that a 3-ø balanced load draws three times as much power when connected in delta, as it would draw when connected in star. 4M

ii) A symmetrical 3-phase, 400 volt system supplies a balanced load of 0.8 lagging power factor and connected in star. If the line current is 34.64 A, find: (a) Impedance. (b) Resistance and reactance per phase. (c) Total power. (d) Total reactive volt amperes. 6M

15. A). i) Explain what do you understand by coefficient of coupling and derive the expression for it. 4M

ii) The numbers of turns in two coupled coils are 600 and 1700 turns respectively. When a current of 6A flow in coil 2 the total flux in the coil is 0.8 mWb and the flux linking with the first coil is 0.5 mWb. Calculate L1, L2, M and K. 6M

OR

15. B). i) Define (a) Graph b) Twig 2M

ii) Draw the oriented network graph from the incidence matrix given below 8M

Nodes	Branches					
	1	2	3	4	5	6
A	-1	0	0	+1	-1	0
B	+1	-1	0	0	0	-1
C	0	+1	-1	0	+1	0
D	0	0	+1	-1	0	+1

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H.T No: | | | | | | | | | | | **R22**

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech I Semester Supplementary Examinations July-2025**
Course Name : **English for Skill Enhancement**
Course Code : **A400101**
Branch : **CE, ME, CSC, CSM, CSD & AIM**
Date & Session : **16-07-2025 AN** **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. Write any four words with the Prefix '-a'. 1 M
2. What has happened as a result of the 'Toasting' of English in America? 1 M
3. Expand 'JRD' and Explain the word 'Appro'. 1 M
4. List out the benefits of 'Scanning' as a Reading Strategy. 1 M
5. English has borrowed many words from Indian languages, write at least two of them. 1 M
6. 'Learning to learn Online', write your perspective. 1 M
7. **'Art** and **Literature'**, explain the meanings of the words in the title. 1 M
8. Define cli·ché.. 1 M
9. Give the plural form of the words i) Scarf ii) Fungus. 1 M
10. Pick the right collocation: 1 M
    She has a hard handshake
    She has a firm handshake.

PART-B

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

11.A). Underline the Phrases in the given statements. 10M
   i. Faced with so many problems, I decided to get professional help.
   ii. Before taking any medicine, I always speak to my doctor.
   iii. In the morning, it is best to get up early.
   iv. I love learning, so I spend a lot of time reading.
   v. Dhoni finished the run, with a great speed.

OR

11. B). Do you agree with Narayan that we need a 'Bharat' brand of English? Why? 10M

12. A). Rewrite the correct spellings of the following words: 10M
   i) Mileenniuumm ii) parlament iii) restarent iv) pronounciation v) relavent vi) license vii) guarenttee viii) maintainance ix) certeficate x) momento.

OR

12. B). Describe the concept "Gender Bias". Do you really feel the existence of "Gender Bias" in the contemporary society? Why? 10M

(P.T.O..)

13. A). Write the difference between 'Intensive Reading' and 'Extensive Reading' with an example. 10M

OR

13. B). You are applying for the post of a Data Scientist in a multinational company (Google). The requisite qualification and skills needed are Graduate from STEM (Science, technology, engineering, mathematics) background, computer knowledge and good communication skills. Candidates with experience will be given preference. Prepare a Resume/Curriculum Vitae along with a cover letter. 10M

14. A). How do different Art forms influence human civilization? 10M

OR

14. B). Elucidate the power of drama and films on human lives in your own words? 10M

15. A). Explain the elements of Report writing in detail. 10M

OR

15. B). Write a Report in the memo format in which the Manager has a called all the employees for a meeting on 4th October 2025, to discuss the sales outcomes. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech I Semester Supplementary Examinations July-2025**
Course Name : **Basic Electrical Engineering**
Course Code : **A402201**
Branch : **ECE, CSE & IT**
Date & Session : **16-07-2025 AN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

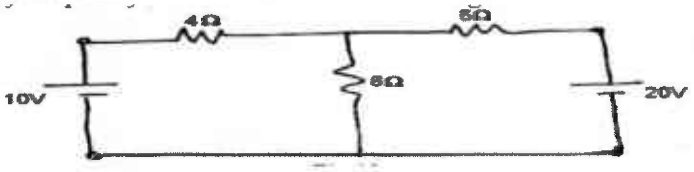
Each question carries ONE mark. **10x1=10M**

1. Define Ohm's Law. 1 M
2. Explain KCL. 1 M
3. Explain concept of real and reactive power. 1 M
4. What are the advantages of three phase circuit over single phase circuit. 1 M
5. Differentiate ideal and practical transformers. 1 M
6. List different types of losses in transformer. 1 M
7. Mention applications of induction motors. 1 M
8. Define synchronous speed. 1 M
9. List the Components of LT Switchgear. 1 M
10. What are the different types of methods to improve power factor? 1 M

PART-B

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

11.A). Find the current flowing through 6ohm resistor by using superposition theorem for the given network 10M



OR

11. B). Derive expression for the transient response of an R- L series circuit excited by DC supply. 10M

12. A). Define the RMS value and obtain an expression for the RMS value of sinusoidal current. 10M

OR

12. B). Derive the relationship between line and phase quantities in a three phase Delta connected system with phasor diagram. 10M

13. A). Derive EMF equation of single phase transformer and calculate the number of turns in primary and secondary windings of a single phase 3300/240 V, 50 Hz transformer has a maximum magnetic flux of 0.0315 Wb in the core. 10M

OR

13. B). Explain different types of three phase transformer connections with neat sketches. 10M

(P.T.O..)

14. A). Explain construction and working principle of DC motor. 10M

OR

14. B). Explain the Torque–slip characteristics of a three-phase induction motor with a neat diagram. 10M

15. A). Explain different types of batteries with their characteristics. 10M

OR

15. B). Classify the types of earthing and explain any one of them. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination	:	**B.Tech I Semester Supplementary Examinations July-2025**
Course Name	:	**Engineering Mechanics**
Course Code	:	**A403201**
Branch	:	**CE & ME**
Date & Session	:	**18-07-2025 AN** **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

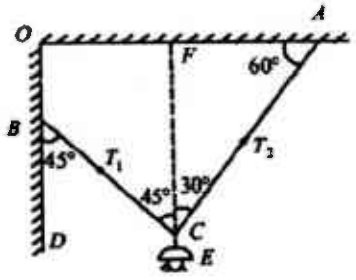
Each question carries ONE mark. **10x1=10M**

1.	What is non concurrent force system?	1 M
2.	What are conditions for equilibrium?	1 M
3.	Differentiate between static friction and kinetic friction.	1 M
4.	What is a Wedge?	1 M
5.	Define centroid.	1 M
6.	State the Pappus theorem.	1 M
7.	Define the second Moment of inertia of Sphere.	1 M
8.	State the parallel axis theorem.	1 M
9.	Differentiate between kinetic energy and potential energy.	1 M
10.	State the Principle of Conservation of Momentum.	1 M

PART-B

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

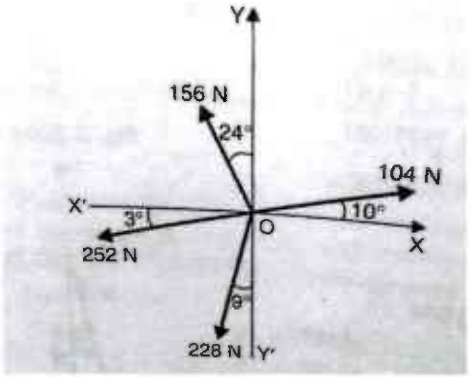
11.A). An Electric light fixture weighing 15N hangs from a point C, by two strings AC and BC, AC is inclined at 60° to the horizontal and BC at 45° to the vertical as shown in fig, Determine the forces in the strings AC and BC. 10M



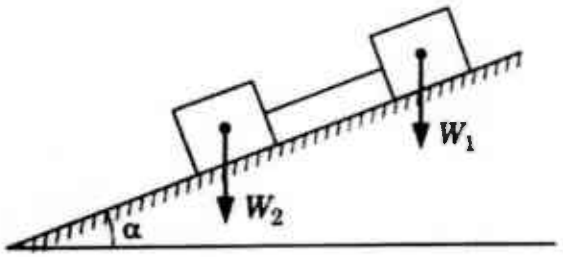
(P.T.O.)

OR

11. B). Find the resultant for concurrent force system as shown in fig. 10M



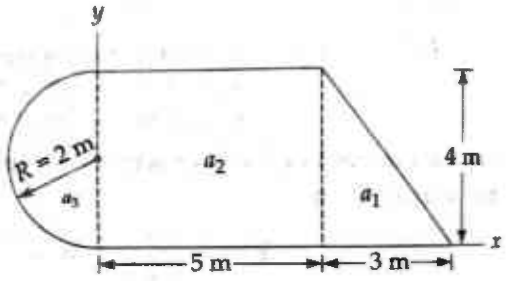
12. A). Two block of weight W1 = 50 N and W2 = 50 N are resting on a rough inclined plane as shown in the figure. If $\mu = 0.3$ for W1 and plane and $\mu = 0.2$ for W2 and plane, find the inclination of the plane for which slipping will impend. 10M



OR

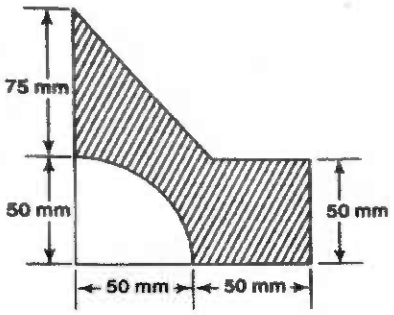
12. B). A screw jack has square threads of mean diameter 10 cm and pitch is 1.25 cm. Determine the force that must be applied at the end of 50 cm long lever, to raise and to lower the weight of 50kN. Find the efficiency of screw jack and determine whether it is self-locking or not? (Assume μ=0.2). 10M

13. A). Determine the centroid for following figure. 10M



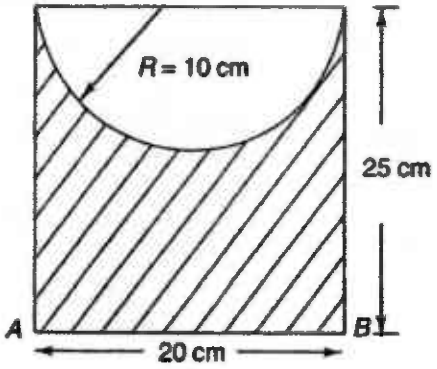
OR

13. B). With respect to the coordinate axes x and y, locate the centroid of the shaded area shown in the figure. 10M



(P.T.O.)

14. A). Find the moment of inertia of the shaded area shown in the figure about the edge AB. 10M



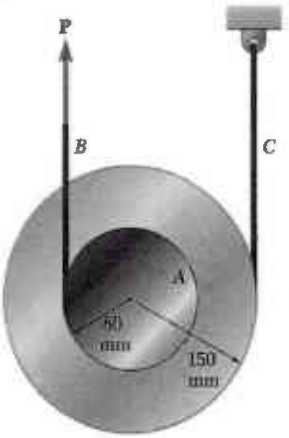
OR

14. B). Derive the mass moment of inertia of a cone about its base having radius r and height h. 10M

15. A). Two bodies A and B are connected by a thread and move along a rough horizontal plane (μ = 0.3) under the action of force of 400 N applied to the body B. Determine the acceleration of the two bodies and tension in the thread using D'Alembert's principle. 10M

OR

15. B). The double pulley shown in figure has a mass of 3 kg and a radius of gyration of 100 mm. knowing that pulley is at rest, a force of 24 N is applied to cord B, determine the velocity of the centre of the pulley after 1.5 sec and tension in cord C. 10M



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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
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Examination : **B.Tech I Semester Supplementary Examinations July-2025**
Course Name : **C Programming and Data Structures**
Course Code : **A405202**
Branch : **EEE & ECE**
Date & Session : **18-07-2025 AN** **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 is a conditional operator? 1 M
2. List the data types in 'C'. 1 M
3. Write the syntax of for loop. 1 M
4. Difference between break and continue. 1 M
5. Write the differences between actual and formal parameters. 1 M
6. List the advantages and disadvantages of pointers. 1 M
7. What is singly Linked List? 1 M
8. What is queue? 1 M
9. What is the necessary condition for Binary search? 1 M
10. What is the worst time complexity of insertion sort? 1 M

PART-B

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

11.A). i) What are 'bitwise' operators and explain with examples? 5M
ii) Describe the process of program development in 'C'. 5M

OR

11. B). i) Explain type casting and its types with a program. 5M
ii) Discuss a C program to swap the values of two variables without using third variable? 5M

12. A). Write a c program to addition of two matrices (2D array) which will be entered by a user. 10M

OR

12. B). Explain the decision making statement in c with example programs. 10M

13. A). Write a C program to find whether a given string is palindrome or not? 10M

OR

13. B). Explain the concept of pointers and explain the operations on pointers and arrays of pointers. 10M

14. A). Construct the algorithms for the following operations on Singly Linked List 10M
i) Deletion at the Beginning
ii) Deletion at the End
iii) Deletion between any node.

(P.T.O.)

OR

14. B). Write about stack implementation using arrays. 10M

15. A). Write an algorithm to search an element in an array using linear search. 10M

OR

15. B). Write a program for selection sort. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **B.Tech I Semester Supplementary Examinations July-2025**
Course Name : **Programming for Problem Solving**
Course Code : **A405201**
Branch : **CSE, IT, CSC, CSM, CSD & AIM**
Date & Session : **18-07-2025 AN** **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.	How to declare a variable?	1 M
2.	List out Unary operators used in C.	1 M
3.	Differentiate between while and do while loops.	1 M
4.	Why is it necessary to give the size of an array in an array declaration?	1 M
5.	Define function.	1 M
6.	Write the syntax of strcpy( ) function.	1 M
7.	What is preprocessor?	1 M
8.	What is the purpose of ifdef statement?	1 M
9.	Define the term: Binary file.	1 M
10.	Differentiate between selection sort and insertion sort.	1 M

PART-B

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

11.A).	i) List the rules for declaring variable. Give valid and invalid examples. ii) Write an algorithm to find HCF of two positive integer numbers.	5M 5M
	OR	
11. B).	Explain about getchar(),scanf(), printf(), gets() and puts() functions.	10M
12. A).	Discuss about decision making statements with example.	10M
	OR	
12. B).	Write a program to find the multiplication of two matrices(size of matrix 2×2).	10M
13. A).	Explain about storage classes with suitable examples.	10M
	OR	
13. B).	Discuss any five string handling functions in detail.	10M
14. A).	Write and explain the general format for declaring, initializing and accessing the members of a structure.	10M
	OR	
14. B).	List and explain the functions used to allocate and free memory dynamically.	10M
15. A).	List and explain various file read/write functions available in C with examples illustrating their usage and implementation.	10M
	OR	
15. B).	Mention the complexity of linear search and binary search algorithm.	10M

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