Hall Ticket Number :										

R-17

Code: 7GC12

I B.Tech. I Semester Supplementary Examinations November 2023

Engineering Chemistry

(Common to CE, ME & CSE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) What are ion exchange resins? Discuss their application in water softening. How are spent resins regenerated? 7M

   b) Differentiate between scale and sludge. How are scales formed? What are their disadvantages? 7M

OR

2. a) Comment on the hardness of water. What happens when hard water is boiled? Give equations 7M

   b) Determine the temporary, permanent & total hardness of a hard water sample containing $Ca(HCO_3)_2$ = 40.5 mg/L, $Mg(HCO_3)_2$ = 46.5 mg/L, $MgSO_4$ = 27.6 mg/L, $CaCl_2$ = 22.4 mg/L, $CaSO_4$ = 32.1 mg/L. 7M

UNIT–II

3. Explain the composition ,applications and advantages of the following cells
   (i)Ni-Cd cell & (ii) Lithium ion cell. 14M

OR

4. a) Define corrosion. Explain dry corrosion and its mechanism. 7M

   b) Explain the following methods for preventing the corrosion.
   (i)electroplating (ii) Electrolessplating 7M

UNIT–III

5. a) What is vulcanization of rubber? Explain why natural rubber needs vulcanization. How is it carried out? 7M

   b) Write a note on the classification of polymers with examples 7M

OR

6. Write a note on processing of raw rubber? Explain the draw backs of raw rubbers. 14M

UNIT–IV

7. Describe the Otto Hoffmann's method of manufacture of metallurgical coke with a neat labelled diagram 14M

OR

8. Describe the method of determination of calorific value of a solid fuel by using Bomb calorimeter with a neat labelled diagram 14M

UNIT–V

9. Write the percentage chemical composition of Portland cement. Describe the manufacture of Portland cement with necessary equations. 14M

OR

10. Describe the following
    i) Thick film lubrication ii) Extreme pressure lubrication. 14M

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Hall Ticket Number :										

R-17

Code: 7G512

I B.Tech. I Semester Supplementary Examinations November 2023

Engineering Mechanics – Statics

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

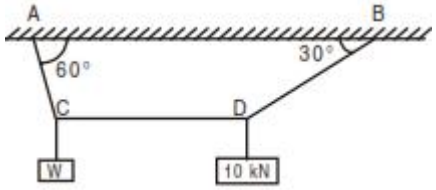
UNIT–I

1. a) State varignon's theorem 4M

   b) State and prove Lami's theorem. 10M

OR

2. A cord supported at A and B carries a load of 10 KN at D and a load of W at C as shown in Fig. 3. Find the value of W so that CD remains horizontal.

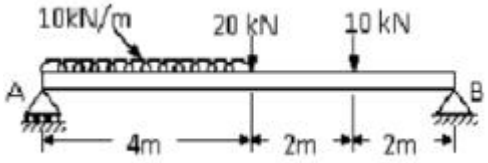


14M

UNIT–II

3. a) List out the assumptions made in analysis of trusses by the method of joints. 6M

   b) A beam AB is located supported and loaded as shown in Figure. Find the reactions at the supports.



8M

OR

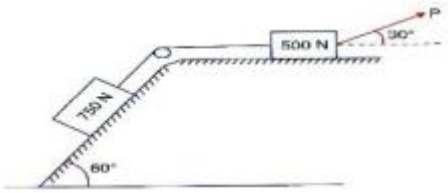
4. a) Explain various types of loads acting on beams. 9M

   b) Explain the reactions at i) fixed support and ii) roller support. 5M

UNIT–III

5. a) List out any 4 laws of static friction. 4M

   b) What is the value of P in the system shown in figure to cause the motion of 500 N block to the right side? Assume the pulley is smooth and the coefficient of friction between other contact surfaces is 0.20.



10M

OR

6. a) Explain (i) Angle of friction (ii) Angle of repose 4M

   b) A body, resting on a rough horizontal plane, required a pull of 180 N inclined at 30° to the plane just to move it. It was found that a push of 220 N inclined at 30° to the plane just moved the body. Determine the weight of the body and the coefficient of friction 10M

UNIT–IV

7. a) State and explain Pappus and Guldinus theorems. 7M

   b) Determine surface area and volume of sphere using the Pappus and Guldinus theorems. 7M

OR

8. Determine the centre of gravity of a composite body formed by placing a brass cone with a base diameter of 8 cm and 12cm height over a steel cylinder of same diameter and a height of 10 cm. Density of steel is 7850 kg/m^3 and that of brass is 8650 kg/m^3. 14M

UNIT–V

9. a) State and prove parallel axis theorem 6M

   b) Derive the expression for moment of inertia of a triangle about centroidal axis. 8M

OR

10. Find the mass moment of inertia of a right circular cone of base radius ‘R’ and mass ‘M’ about the axis of the cone. 14M

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Hall Ticket Number :										

R-17

Code: 7GC14

I B.Tech. I Semester Supplementary Examinations November 2023

Engineering Mathematics – I

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) Solve the equations x+2y+3z=0, 3x+4y+4z=0, 7x+10y+12z=0 7M

   b) Find the eigen values and eigen vectors of $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 7M

OR

2. a) Find the rank of $\begin{bmatrix} 2 & -4 & 3 & -1 & 0 \\ 1 & -2 & -1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{bmatrix}$ 7M

   b) Investigate the values of ª *and* « so that the equations 2x+3y+5z=9, 7x+3y-2z=8, 2x+3y+ ª z = « , have (i) no solution, (ii) a unique solution and (iii) an infinite number of solutions. 7M

UNIT–II

3. a) Show that the matrix $\begin{bmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{bmatrix}$ is Skew-Hermitian and hence find eigen values 7M

   b) Reduce the quadratic form $10x^2 + 2y^2 + 5z^2 - 4yz - 10zx + 5xy$ to the canonical form by linear transformation. 7M

OR

4. a) Define Hermitian, skew-Hermitian, Unitary Matrices and give example for each 7M

   b) Find the eigen values of the matrix $\begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$ 7M

UNIT–III

5. a) A body is kept in air with temperature 25^0c cools from 140^0c to 80^0c in 20 minutes. Find the when the body cools down to 35^0c 7M

   b) A bacterial culture, growing exponentially, increases from 200 to 500 grams in 1 hour. How many grams will be present after 90 minutes? 7M

OR

6. a) Find the orthogonal Trajectories of the family of curves $x^2 + y^2 + 2gx + c = 0$ where g is parameter. 7M

   b) Find the orthogonal Trajectories of the family of curves $r^n = a^n \cos n\theta$ 7M

UNIT–IV

7. a) Solve $\frac{d^3y}{dx^3} - y = e^x + \sin 3x + 2$ 7M

b) In L-C-R circuit, the charge q on a plate of a condenser is given by Solve $L\frac{d^2q}{dt^2} - \frac{dq}{dt} + \frac{q}{C} = E\sin pt$ the circuit is turned to resonance so that $\frac{p^2}{LC}$. Find the current i 7M

OR

8. a) Solve by the method of variation of parameters $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} = e^x \sin x$ 7M

b) Solve $(D+2)(D-1)^2 y = e^{-2x} + 2\sinh x$ 7M

UNIT–V

9. a) Find the first and second order partial derivatives of $f(x,y) = ax^2 + 2hxy + by^2$ and verify $\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x}$ 7M

b) If $x = r\sin^{-}\cos¤$, $y = r\sin^{-}\sin¤$, $z = r\cos^{-}$, Show that $\frac{\partial(x,y,z)}{\partial(r,^{-},¤)} = r^2\sin^{-}$ 7M

OR

10. If $U = \log\left(x^3 + y^3 + z^3 - 3xyz\right)$ prove that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 U = \frac{-9}{(x+y+z)^2}$ 14M

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Hall Ticket Number :										

R-17

Code: 7G111

I B.Tech. I Semester Supplementary Examinations November 2023

Problem Solving Techniques and C Programming

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) Give a comparison between system and application software's with examples. 7M

   b) Write an algorithm to find the greatest number among the three given numbers. 7M

OR

2. a) Explain in detail about the software development method. 7M

   b) List and explain various symbols used in flowcharts with figures 7M

UNIT–II

3. a) Describe the structure of a C program with example 7M

   b) What is the purpose of the comma operator? Within which control statement does the comma operator usually appear? 7M

OR

4. a) Explain various format modifiers available in C language. 7M

   b) What are relational operators? Explain about relational operators with suitable programming example. 7M

UNIT–III

5. a) In what way a do – while loop differs from while loop. Explain. 7M

   b) Write a C program to print all the prime numbers between 1 to 100 7M

OR

6. a) Write 'C' program to print the Fibonacci sequence. 7M

   b) Discuss selection statements with suitable examples for each. 7M

UNIT–IV

7. a) Write a 'C' program to read a string from keyboard and print the numbers of uppercase letters, lower case letters, digits, spaces and special characters. 7M

   b) What is meant by string? Explain strings with example 'C' program. 7M

OR

8. a) Define an array. Write a program to find the largest and smallest element in a given array 7M

   b) Write a C program to check whether the given matrix is symmetric or not. 7M

UNIT–V

9. a) Write a C program to exchange the value of two integers using call by reference. 7M

   b) Write a c program to find factorial of a number using recursive function 7M

OR

10. a) Define scope. Briefly explain the scope, life time and visibility of Identifier. 7M

    b) Explain about pre-processor commands with examples. 7M

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