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**R-17**

**Code: 7GC12**

I B.Tech. I Semester Supplementary Examinations March/April 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. Give detailed procedure for the determination of dissolved oxygen in water.
- OR**
- 2. a) Explain the basic principle involved in the estimation of hardness by EDTA method?
  - b) Why is sterilization of water necessary? Discuss any two methods of sterilization.

**UNIT-II**

- 3. Give reasons for the following
    - (i) Corrosion of water-filled tank occurs below the waterline
    - (ii) A Copper equipment should not possess a small Steel bolt
- OR**
- 4. Discuss various factors which influence the corrosion of metals?

**UNIT-III**

- 5. Write a note on processing of raw rubber? Explain the draw backs of raw rubbers.
- OR**
- 6. a) Differentiate Thermoplastic and Thermosetting plastics with suitable examples.
  - b) Write a note on the classification of polymers with examples

**UNIT-IV**

- 7. The percentage composition of a sample of coal by weight was found to be: C = 76%, H = 5.2%, O = 12.8%, N = 2.7%, S = 1.2%, the remaining being ash. Calculate the minimum weight of air necessary for complete combustion of 1 kg of coal and percentage composition by weight of dry products, if 50% excess air supplied.
- OR**
- 8. a) Describe the determination of calorific value of a solid fuel using bomb calorimeter.
  - b) Describe the Production and uses of water gas and Biogas.

**UNIT-V**

- 9. a) Explain the importance of refractories and their applications.
  - b) Describe the mechanism of extreme pressure lubrication
- OR**
- 10. Describe the manufacture of Portland cement by wet method with a neat labelled diagram of rotary kiln.

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**Code: 7GC14**

I B.Tech. I Semester Supplementary Examinations March/April 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. Define the rank of the matrix and find the rank of the following matrix

$$\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$$

OR

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

## UNIT-II

3. 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

OR

4. Find the transformation that will transform
- $10x^2 + 2y^2 + 5z^2 + 6yz - 10zx - 4xy$
- into a sum of squares

## UNIT-III

5. Solve
- $(1 + y^2)dx = (\tan^{-1} y - x)dy$

OR

6. Solve
- $\left( \frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}} \right) \frac{dx}{dy} = 1$

## UNIT-IV

7. 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
- $i$

OR

8. Solve
- $\frac{d^2y}{dx^2} - 3 \frac{dy}{dx} + 2y = x e^{3x} + \sin 2x$

## UNIT-V

9. If
- $x + y + z = u$
- ,
- $y + z = uv$
- ,
- $z = uvw$
- , then evaluate
- $\frac{\partial(x, y, z)}{\partial(u, v, w)}$

OR

10. Verify Lagrange's mean value theorem for
- $f(x) = \log_e x$
- in
- $[1, e]$

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<b>R-17</b>
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**Code: 7G111**

I B.Tech. I Semester Supplementary Examinations March/April 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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<b>UNIT-I</b>
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Marks

1. a) Give a comparison between system and application software's with examples. 7M  
b) List and explain various symbols used in flowcharts with figures 7M

**OR**

2. a) Discuss about different computer languages with examples. 7M  
b) Explain in detail about the software development method. 7M

<b>UNIT-II</b>
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3. a) What are bitwise logical operators? Explain about bitwise logical operators with suitable programming example. 7M  
b) Evaluate the following expressions:  
(i)  $a*(3+b)/2-c++ *b$  where  $a=3, b=4$  and  $c=5$  (ii)  $!(4+5*0)>=6-4$  7M

**OR**

4. a) What is the need of explicit type conversion in C? How to cast the data? 7M  
b) What is the need of escape sequence? Write a sample program to illustrate escape sequences. 7M

<b>UNIT-III</b>
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5. a) Give the control flow diagram of the *for loop*. How is the execution of 'for' loop proceeds? 7M  
b) Write a C program to find biggest of three integer numbers. 7M

**OR**

6. a) Explain counter-controlled and condition-controlled loops with examples. 7M  
b) Write a C program to find the sum of first and last digit of a number 7M

<b>UNIT-IV</b>
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7. a) What are the different types of arrays in C? Explain with a suitable example, array declaration, initialization and accessing of the elements for these different types. 7M  
b) Write a C program to accept 3x3 matrix and display elements of the matrix. 7M

**OR**

8. a) Explain any five string manipulation functions with example 10M  
b) Write a program to find highest and smallest number in the given array. 4M

<b>UNIT-V</b>
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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
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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**Code: 7G512**

I B.Tech. I Semester Supplementary Examinations March/April 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)

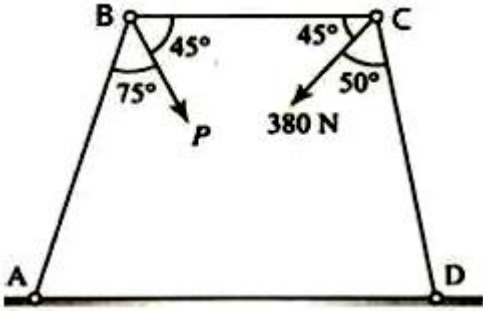
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**UNIT-I**

- 1. a) How do you define the system of forces? Sketch at least three systems of forces. 7M
- b) State and prove Lami's theorem. 7M

**OR**

- 2. In the four-bar mechanism ABCD, as shown in fig. below, determine the force P for equilibrium.



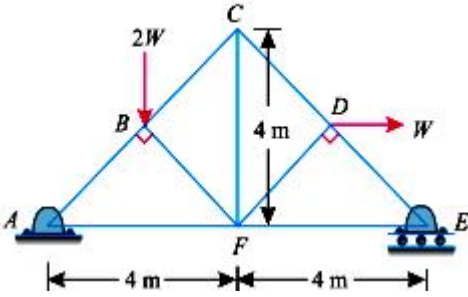
14M

**UNIT-II**

- 3. a) Explain various types of loads acting on beams. 7M
- b) Explain the reactions at i) fixed support and ii) roller support. 7M

**OR**

- 4. A truss of 8 m span and 4 m height is loaded as shown in Fig. Find the magnitude and nature of the forces in all the members.



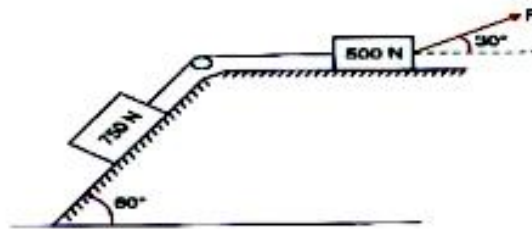
14M

**UNIT-III**

- 5. 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 14M

OR

6. 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.



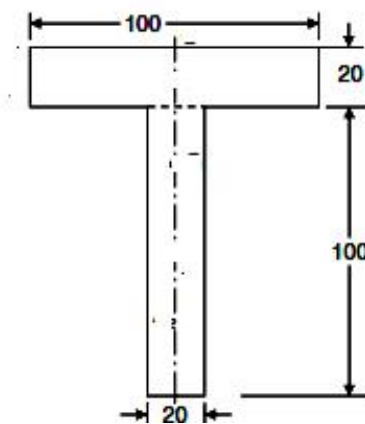
14M

UNIT-IV

7. a) Determine centroid of semicircle whose radius is  $R$ . 7M  
 b) Determine surface area and volume of sphere using the Pappus and Guldinus theorems. 7M

OR

8. Locate the centroid of the T-section shown in the Fig.

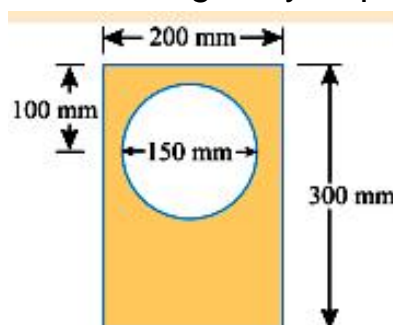


UNIT-V

9. a) State and prove perpendicular axis theorem. 5M  
 b) Find the mass moment of inertia of a right circular cone of base radius ' $R$ ' and mass ' $M$ ' about the axis of the cone. 9M

OR

10. Find the moment of inertia of a hollow section shown in Fig. about an axis passing through its centre of gravity or parallel X-X axis.



14M

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