

**Code: 5GC12**

I B.Tech. I Semester Supplementary Examinations November 2019

**Engineering Chemistry**  
( Common to CE, ME, CSE & IT )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Give the detailed procedure for the estimation of dissolved oxygen present in water with principle and chemical equations. 7M
- b) With the help of neat diagram, explain the use of Zeolite process for softening of water and its limitations. 7M

**OR**

2. a) What is the principle of EDTA method? Describe the estimation of hardness of water by EDTA method. 7M
- b) Calculate carbonate and non carbonate hardness of a sample of water contains the following salts per litre.  
Mg(HCO<sub>3</sub>)<sub>2</sub>=7.3mg, Ca(HCO<sub>3</sub>)<sub>2</sub>=16.2mg, MgCl<sub>2</sub>=9.5mg, CaSO<sub>4</sub>=13.6mg. 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) Explain with examples the terms: addition polymerization, condensation polymerization and co-polymerization. 7M
- b) How the following are produced?  
(i) Buna-s (ii) polyurethane. Mention their properties and uses. 7M

**OR**

6. Give an account of preparation, properties and engineering uses of the following  
(i) PVC (ii) Nitrile rubber (iii) poly phosphazines 14M

**UNIT-IV**

7. What are the characteristics of metallurgical coke? Describe the manufacture for metallurgical coke by Otto-Hoffmann's method. 14M

**OR**

8. a) With a neat diagram describe the orsat's gas analysis method. 10M
- b) Define calorific value of a fuel. Distinguish gross and net calorific value of fuel. 4M

**UNIT-V**

9. What are rocket propellants? How are they classified? What are the requirements for the selection of a good propellant? 14M
- OR**
10. What is setting and hardening of cement? Write the chemical reactions that take place during the setting and hardening of cement and explain? 14M

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Code: 5G513

I B.Tech. I Semester Supplementary Examinations November 2019

**Engineering Drawing-I**

( Common to EEE, ECE, CSE &amp; IT )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Bisect an angle AOB. i). Angle AOB =  $73^{\circ}$  ii). Angle AOB =  $137^{\circ}$ . 7M  
 b) Inscribe a square in a circle of Radius 20 MM. 7M

**OR**

2. a) Divide a circle of 30 mm radius in to 8 equal parts 7M  
 b) Construct a hexagon of side length 30 mm 7M

**UNIT-II**

3. The major axis of an ellipse is 150 mm long and the minor axis is 100 mm long. Find the foci and draw the ellipse by arcs of circles method. Draw a tangent to the ellipse at a point on it 25 mm above the major axis. 14M

**OR**

4. Draw an ellipse having the major axis of 70 mm and the minor axis of 40 mm by concentric circle method. Draw a tangent to it at any convenient point. 14M

**UNIT-III**

5. Construct a hypocycloid, rolling circle of 55 mm diameter and directing circle of 125mm diameter. Draw a tangent to it at a point 40 mm from the center of directing circle. 14M

**OR**

6. Draw an epicycloid if a circle of 40 mm diameter rolls outside another circle of 120mm diameter for one revolution 14M

**UNIT-IV**

7. a) Draw the projections of the following points on a common reference line. Take 30mm distance between the projections. 8M  
 i) A, 35mm above the H.P. & 25mm in front of V.P.  
 ii) B, 40mm below the H.P & 15mm behind the V.P.  
 iii) C, 50mm above H.P & 25mm behind the V.P  
 iv) D, 45mm below the H.P & 20mm in front of V.P

- b) Draw the projections of a straight line 70 mm long when it is parallel to both HP and VP. It is 15 mm in front of VP and 40 mm above HP. 6M

**OR**

8. a) A point 35 mm above XY line is the plane view of two points P & Q the elevation of P is 40 mm above the H.P. While that of the point Q is 45 mm below the H.P. Draw the projections of the points and state their positions with reference to the principal planes on the quadrant in which they lie. 7M

- b) A point A is 25 below the HP and lies in the third quadrant. Its shortest distance from XY is 45. Draw its projections. 7M

**UNIT-V**

9. A line AB, 90 mm long, is inclined at  $30^{\circ}$  to the H.P. Its end A is 12 mm above the H.P. and 20 mm in front of the V.P. Its front view measures 65 mm. Draw the top view of AB and determine its inclination with the V.P. 14M

**OR**

10. A line CD of 100 long, is inclined at  $45^{\circ}$  to HP and  $30^{\circ}$  to VP. Its end A is on HP and 25 in front of VP. Draw the projections. 14M

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**Code: 5GC14**

I B.Tech. I Semester Supplementary Examinations November 2019

### Engineering Mathematics-I

( Common to All Branches )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. Solve  $x \frac{dy}{dx} + y = x^3 y^6$  14M

**OR**

2. a) Find the Orthogonal trajectories of the family of curves  $y = ax$  7M

b)  $\frac{dy}{dx} + xy = e^{-x^2/2}$  7M

**UNIT-II**

3. a) Solve  $(D^2 + 3D + 2)y = e^x$  7M

b) Solve  $(D^2 + 4)y = \sin x$  7M

**OR**

4. Solve  $(D^2 + 4D + 3)y = e^{-x} \sin x + xe^{3x}$  14M

**UNIT-III**

5. a) Verify Rolle's Theorem for  $f(x) = e^x(\sin x - \cos x)$  in  $\left(\frac{f}{4}, \frac{5f}{4}\right)$  7M

b) Expand  $\sin x$  in powers of  $\left(x - \frac{f}{2}\right)$  7M

**OR**

6. a) Test for convergence of the series  $\sum \frac{n^3}{3^n}$  7M

b) Discuss the convergence of the series  $1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \dots$  7M

**UNIT-IV**

7. If  $u = x^2 - 2y, v = x + y + z, w = x - 2y + 3z$ , then find  $\frac{\partial(u, v, w)}{\partial(x, y, z)}$  14M

**OR**

8. If  $u = x^2 - y^2, v = 2xy$  and  $x = r \cos \theta, y = r \sin \theta$  then find  $\frac{\partial(u, v)}{\partial(r, \theta)}$  14M

**UNIT-V**

9. Trace the curve  $r = a(1 - \cos \theta)$  14M

**OR**

10. Trace the curve  $y^2(a - x) = x^2(a + x)$  14M

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| <b>R-15</b> |
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**Code: 5GC15**

I B.Tech. I Semester Supplementary Examinations November 2019

**Mathematical Methods-I**

( Common to CSE & IT )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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| <b>UNIT-I</b> |
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1. a) Find the rank of 
$$\begin{bmatrix} 1 & 4 & 3 & -2 & 1 \\ -2 & -3 & -1 & 4 & 3 \\ -1 & 6 & 7 & 2 & 9 \\ -3 & 3 & 6 & 6 & 12 \end{bmatrix}$$
 7M
- b) Solve the system of equations  $x+y+w=0$ ,  $y+z=0$ ,  $x+y+z+w=0$ ,  $x+y+2z=0$  7M

**OR**

2. a) Reduce the following matrix into its normal form and hence find its rank.
- $$\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$
- 7M
- b) If the following system has non-trivial solutions, prove that  $a+b+c=0$  or  $a=b=c$ ;  
 $ax+by+cz=0$ ,  $bx+cy+az=0$ ,  $cx+ay+bz=0$  7M

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| <b>UNIT-II</b> |
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3. a) State and verify Cayley-Hamilton theorem for the matrix  $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 1 \\ 3 & 3 & 1 \end{bmatrix}$  and hence find  $A^4$ . 7M

- b) Diagonal the matrix  $A = \begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$  7M

**OR**

4. a) Find the characteristic polynomial of the matrix  $A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 5 \end{bmatrix}$ . Verify Cayley Hamilton theorem and hence find  $A^{-1}$  7M

- b) Determine the modal matrix P of  $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{bmatrix}$ . Verify that  $P^{-1}AP$  is a diagonal matrix. 7M

## UNIT-III

5. a) Find the transformation that will transform  $10x^2 + 2y^2 + 5z^2 + 6yz - 10zx - 4xy$  into a sum of squares 7M

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

OR

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

b) Identify the Nature, Index and Signature of the Quadratic form  $x_1^2 + 4x_2^2 + x_3^2 - 4x_1x_2 + 2x_1x_3 - 4x_2x_3$  7M

## UNIT-IV

7. a) Evaluate Real Root of the Equation  $xe^x - \cos x = 0$  using Newton Raphson Method. 7M

b) Find a real root of the equation  $x^3 - 2x - 5 = 0$  using false position. 7M

OR

8. a) Find the root of the  $x^3 - 4x - 9 = 0$ , using the bisection method correct to three decimal places. 7M

b) Find the positive root of  $x^4 - x = 10$  correct to three decimal places, using Newton-Raphson method 7M

## UNIT-V

9. a) From the following table, find  $e^{1.02}$ , using Newton's forward formula.

|       |        |        |        |        |        |        |        |
|-------|--------|--------|--------|--------|--------|--------|--------|
| x     | 1.00   | 1.05   | 1.10   | 1.15   | 1.20   | 1.25   | 1.30   |
| $e^x$ | 2.7183 | 2.8577 | 3.0042 | 3.1582 | 3.3201 | 3.4903 | 3.6693 |

7M

b) Find the value of  $\cos(1.74)$  from the following table

|       |        |        |        |        |        |
|-------|--------|--------|--------|--------|--------|
| x     | 1.7    | 1.74   | 1.78   | 1.82   | 1.86   |
| Sin x | 0.9857 | 0.9916 | 0.9781 | 0.9691 | 0.9584 |

7M

OR

10. a) Using Lagrange formula find  $f(4)$ . Given

|   |    |   |    |     |
|---|----|---|----|-----|
| x | 0  | 2 | 3  | 6   |
| y | -4 | 2 | 14 | 158 |

7M

b) Find  $f'(7.5)$  from the following table.

|      |       |       |       |       |       |       |       |
|------|-------|-------|-------|-------|-------|-------|-------|
| x    | 7.47  | 7.48  | 7.49  | 7.50  | 7.51  | 7.51  | 7.53  |
| f(x) | 0.193 | 0.195 | 0.198 | 0.201 | 0.203 | 0.206 | 0.208 |

7M

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**Code: 5G111**

I B.Tech. I Semester Supplementary Examinations November 2019

**Problem Solving Techniques and Introduction to C Programming**

( Common to All Branches )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Give a comparison between system and application softwares with examples. 7M  
 b) Write an algorithm to find the greatest number among the three given numbers. 7M

**OR**

2. a) Discuss about different computer languages with examples. 7M  
 b) Describe the process of program development. 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. Explain with examples the different types of operators used in C. 14M

**UNIT-III**

5. a) Differentiate between if statement and if-else statement with suitable examples and proper syntax. 7M  
 b) Give the control flow diagram of the *for loop*. How is the execution of 'for' loop proceeds? 7M

**OR**

6. a) Discuss selection statements with suitable examples for each. 7M  
 b) Write a C program to check whether a given number is Palindrome or not 7M

**UNIT-IV**

7. 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 read a string from keyboard and print the numbers of uppercase letters, lower case letters, digits, spaces and special characters. 7M

**OR**

8. a) What is meant by arrays of strings? When it will be used? Explain with a 'C' program. 7M  
 b) Write a C program that reads characters from the keyboard and writes them to a disk file until the user types a dollar sign. 7M

**UNIT-V**

9. a) What is the scope of variables of type extern, auto, register and static? Explain with example. 10M  
 b) What is meant by user defined function? Explain with an example C program 4M

**OR**

10. a) Explain about calling function, called function and actual and formal arguments. 7M  
 b) Compare call by value and call by reference and explain using suitable example 7M

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