



**CVR COLLEGE OF ENGINEERING**  
*An UGC Autonomous Institution - Affiliated to JNTUH*  
**B.Tech. I Year II Sem. Model Paper-1**  
**Subject: Computational Mathematics**

(Common to All)

**PART – A**

**Short Answer Questions:**

1. Obtain a formula to find square root of  $N$  ( $N > 0$ ) using Newton-Raphson method.
2. Find a Positive root of  $x^3 - 5x + 1 = 0$  using bisection method upto third approximation.
3. When do you say a matrix is diagonally dominant?
4. Solve  $14x - 3y = 8$ ,  $x + 5y = 1$  by Gauss Jacobi method upto two approximations.
5. Use Iteration method (method of successive approximation) to find a positive root of  $xe^x = 1$  upto third approximation.

**PART – B**

**Long Answer Questions:**

6. a) Find a real root of  $\cos x - x^2 - x = 0$  correct to three decimal places using Regula-Falsi method.  
b) Using Newton-Raphson method, find the real root of  $x \tan x + 1 = 0$  correct to five decimal places.

**(OR)**

7. a) Find a real root of  $x^4 - x - 10 = 0$  using bisection method correct to three decimal places.  
b) Use the fixed point iteration method to find a root of  $x = \frac{1}{2} + \sin x$  correct to four decimal places.

8. Apply LU decomposition method to solve the system of equations

$$2x + 3y + z = 9, \quad x + 2y + 3z = 6, \quad 3x + y + 2z = 8$$

**(OR)**

9. a) Find approximate solution by Gauss-jacobi method correct to two decimal places

$$9x - 2y + z - t = 50, \quad x + 7y - 3z + t = 20, \quad -2x + 2y + 7z + 2t = 22, \quad x + y - 2z + 6t = 18$$

b) Find approximate solution by Gauss-seidel method correct to three decimal places

$$8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z = 35$$

10. a) Use Gauss elimination method to solve

$$2x_1 + 4x_2 + x_3 = 3, 3x_1 + 2x_2 - 2x_3 = -2, x_1 - x_2 + x_3 = 6$$

b) Use Gauss elimination with partial pivoting to solve

$$x_1 + x_2 - x_3 = 2, 2x_1 + 3x_2 + 5x_3 = 3, 3x_1 + 2x_2 - 3x_3 = 6$$

(OR)

11. a) Find a real root of  $x - \cos x = 0$  using bisection method correct to three decimal places.

b) Find a root of the equation  $x \sin x + \cos x = 0$  using Newton-Raphson method correct to four decimal places.

## Model Paper-2

### PART – A

Answer **ALL** questions

**5x2 = 10 M**

1. Find an approximate root of the equation  $3x = e^x$  by bisection method between 0 and 1.
2. Find an approximate root of the equation  $2x - \log_{10} x = 7$  which lies between 3.5 and 4 by false – position method.
3. Find a positive root of  $x^4 - x - 10 = 0$  by iteration method up to two iterations.
4. Apply Gauss elimination method to solve

$$2x + y + z = 10, 3x + 2y + 3z = 18, x + 4y + 9z = 16.$$

5. Write the procedure to find L and U matrices in LU decomposition method.

### PART – B

Answer any all of the following

**3x10= 30M**

6 a) Using Newton-Raphson method, find a root of the equation

$$x + \log_{10} x = 3.375 \text{ correct to 4-decimal places.}$$

b) Find a +ve root of  $3x = \cos x + 1$  by using iteration method.

(OR)

7 a) Find an approximate root of the equation  $x^3 - x - 11 = 0$  using bisection method correct to four decimal places.

b) Find an approximate root of the equation  $\log x = \cos x$  using Regula-Falsi method.

8 a) Solve the system of equations

$$10x_1 - 2x_2 - x_3 - x_4 = 3, -2x_1 + 10x_2 - x_3 - x_4 = 15,$$

$$-x_1 - x_2 + 10x_3 - 2x_4 = 27, -x_1 - x_2 - 2x_3 + 10x_4 = -9 \text{ by Gauss Jacobi's method.}$$

b) Solve by LU decomposition method :

$$2x + 3y + z = 9, x + 2y + 3z = 6, 3x + y + 2z = 8.$$

(OR)

9 a) Solve  $5x - y + 3z = 10$ ,  $3x + 6y = 18$ ,  $x + y + 5z = -10$  by Jacobi's method with  $(3, 0, -2)$  as the initial approximation

b) Solve the system of equations by Gauss elimination with pivoting

$$2x - 3y + z = -1, x + 4y + 5z = 25, 3x - 4y + 5z = 2.$$

10 a). By iteration method, find the root correct to 3-decimals of the equation  $x = \cos x$  near  $x = \pi/4$ .

b) By Newton-Raphson method, find a root of  $3x = 1 + \cos x$ .

(OR)

11 Solve the following equations using LU decomposition method

$$10x_1 + 7x_2 + 8x_3 + 7x_4 = 32, \quad 7x_1 + 5x_2 + 6x_3 + 5x_4 = 23,$$

$$8x_1 + 6x_2 + 10x_3 + 9x_4 = 33, \quad 7x_1 + 5x_2 + 9x_3 + 10x_4 = 31.$$

## ASSIGNMENT-1

### Short Answer Questions

1. Find an approximate root of the equation  $x - \cos x = 0$  upto two iterations using bisection method.
2. Find an iterative formula to compute cube root of a number using Newton-Raphson method.
3. Find the function  $\phi(x)$  in the context of method of successive approximations to find a root of the equation  $x^3 + x^2 - 1 = 0$ .
4. Solve by Jacobi's iterative method up to second iteration  
 $10x + 2y + z = 9, x + 10y - z = -22, -2x + 3y + 10z = 22$ .
5. What do you mean by a diagonally dominant system? Give an example.
6. Use Gauss elimination method to solve  $3x + 4y = 11, x + 2y = 5$ .

### Long Answer Questions

1. Find the smallest positive real root of  $x^4 - x - 10 = 0$  using Bisection method, correct to two decimal places.
2. Find the smallest positive real root of  $e^x \sin x = 1$  using Regula-Falsi method, correct to three decimal places.
3. Find the smallest positive real root of  $x^3 - 2x - 5 = 0$  using Fixed point iteration method, correct to three decimal places.
4. Find the smallest positive real root of  $x \log_{10} x = 1.2$  using Newton-Raphson method, correct to four decimal places.
5. Solve  $3x + 2y + 7z = 4, 2x + 3y + z = 5, 3x + 4y + z = 7$  using LU – Decomposition method.
6. Use Gauss elimination with partial pivoting to solve  
 $x_1 + x_2 - x_3 = 2, 2x_1 + 3x_2 + 5x_3 = 3, 3x_1 + 2x_2 - 3x_3 = 6$
7. Find approximate solution by Gauss-jacobi method correct to two decimal places  
 $10x + y - z = 11.19, x + 10y + z = 28.08, -x + y + 10z = 35.61$
8. Solve the system of equations  
 $10x_1 - 2x_2 - x_3 - x_4 = 3, -2x_1 + 10x_2 - x_3 - x_4 = 15,$   
 $-x_1 - x_2 + 10x_3 - 2x_4 = 27, -x_1 - x_2 - 2x_3 + 10x_4 = -9$  by Gauss – Seidel method