B.E. III Semester Examination

BE(LE) - III/02(A)
25006
COMP. ENGINEERING
Course No : MTH - 312
(Numerical Methods Using C-Program)

Time Allowed- 3 Hours

Maximum Marks-100

Note:- Attempt **Five** questions selecting atleast two questions from each section use of calculator is allowed.

Section - A

1. a) Define function . How the functions are declared and defined in C? Give an example to justify your answers.

   b) What are nested looping statements? What are the rules to be followed for nested statements.   **(10,10)**

2. a) Find a root of the equation $x^3 + x - 1 = 0$ using Bisection method correct to three decimal places .

   b) Find a root of the equation $x^3 - 6x - 13 = 0$ using newton Raphson method correct to three decimal places.

   c) Solve the system of equations.

   $x + 4y - z = -5$, $x + y - 6z = -12$, $3x - y - z = 4$

   by Gauss elimination method.   **(6,7,7)**

100

[Turn Over

3. a) Find a root of the equation $x^3 + 10x - 5 = 0$ using secant method correct to three decimal places.

    b) Solve the system of equations

        $2x - y + 3z = 9$, $x + y + z = 6$, $x - y + z = 2$, Using Gauss Jordan method.

    c) Find all the roots of the equation $x^3 - 2x^2 - 5x + 6 = 0$ by Graffe's root squaring method.   (6,7,7)

4. a) Using power method, find the largest eigen value of the matrix.

        $$\begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 1 \\ 4 & 0 & 7 \end{bmatrix}$$

    b) Find all the eigen values of the matrix

        $$\begin{bmatrix} 3 & 0 & 3 \\ 0 & 1 & 1 \\ 2 & 0 & 0 \end{bmatrix}$$

    c) Find a root of the equation $x^4 - x - 10 = 0$ using newton Raphson method correct to three decimal places. (6,7,7)

Section - B

5. a) Use Stirling's formula to find the value of $\sqrt{22.2}$, given that   (6,7,7)

$$\sqrt{20} = 4.472, \sqrt{21} = 4.583$$
$$\sqrt{22} = 4.690, \sqrt{23} = 4.796,$$
$$\sqrt{24} = 4.899$$

b)   Use Bessel's formula to find f(62.5) from the given data

   x :   60   61   62   63   64   65

   f(x) :   7782   7853   7924   7993   8062   8129

c)   Use Gauss's forward formula, find y at x = 1.7489, given that

   x: 1.72   1.73   1.74   1.75   1.76   1.77

   y: 0.1791   0.1773 0.1775 0.1738 0.1720 0.1703

6.   a)   Find the missing values in the following table :   **(6,7,7)**

   x: 45   50   55   60   65

   y: 3.0   -   2.0   -   -2.4

b)   Find the values of y when x = 0.38 by using Newton's interpolation formula, given that

   x: 0   0.1   0.2   0.3   0.4

   y: 1   1.1052   1.2214   1.3499   1.4918

c)   Use lagrange's formula to find f(5), given that

   x: 0   1   3   8

   y: 1   3   13   123

7. a) Use Newton's divided difference formula to find $f(7)$ if $f(3) = 24$, $f(5) = 120$, $f(8) = 504$, $f(9) = 720$ and $f(12) = 1716$.

    b) From the following values of x and y, find $\frac{dy}{dx}$ at x=0.4

        x :   0.1   0.2   0.3   0.4

        y : 1.10517   1.22140   1.34986   1.49182

    c) Evaluate $\int_{0}^{1} \frac{x^2}{1+x^3} dx$ using trapezoidal rule.   (6,7,7)

8. a) Solve $y^1 = x^2 + y^2$, $y(0) = 1$, for $y(1)$ using Euler's method.   (6,7,7)

    b) Use Runge - kutla method, find y (0.1) for
        $y^1 = x + y^2$, $y(0) = 1$

    c) Using Adom's Bashforth method, find

        $y(1.4)$ given $y' = x^2(1+y)$, $y(1) = 1$,
        $y(1.1) = 1.233$, $y(1.2) = 1.548$ and
        $y(1.3)$ 1.979.