

**SECTION - A (5 x 2 = 10)****Answer all the Questions:**

1. If  $\phi(x)$  is Continuous in  $[a, b]$  then under what condition the iterative method  $x = \phi(x)$  has a unique solution in  $[a, b]$ ?

[OR]

2. Write the iterative formula for  $\sqrt{x}$  using Newton Raphson method.  
3. Prove that  $\Delta^2 y_0 = y_2 - 2y_1 + y_0$ .

[OR]

4. Prove that  $E = e^{hD}$ .

5. Write down the formula for  $\left(\frac{dy}{dx}\right)_{x=x_0}$ .

[OR]

6. Write down the Simpson's  $\frac{3}{8}$  rule.

7. Solve by Gauss Elimination method.

$$\begin{aligned} x + y &= 5 \\ 2x - y &= 4 \end{aligned}$$

[OR]

8. State the condition for convergence of Gauss - Seidal method.

9. If  $\frac{dy}{dx} = -y$ ,  $y(0) = 1$  then find  $y(0.01)$  by Euler's method.

[OR]

10. Write the Second order Range - Kutta formula.

**SECTION - B (5 x 4 = 20)****Answer all the Questions:**

11. Find a real root of the equation  $x^3 + x^2 - 1 = 0$ , by iteration method.

[OR]

12. Find a real root of the equation  $x^3 - 2x - 5 = 0$ , by bisection method.

13. Find the missing term in the following data.

$$\begin{array}{cccccc} x: & 0 & 1 & 2 & 3 & 4 \\ y: & 1 & 3 & 9 & - & 81 \end{array}$$

[OR]

14. Find the cubic polynomial which takes the following values :  $y(1) = 24$ ,  $y(3) = 120$ ,

$$y(5) = 336 \text{ and } y(7) = 720 \text{ deduce } y(8).$$

15. From the following table of values of  $x$  and  $y$ , obtain  $\frac{dy}{dx}$  for  $x = 1.2$ .

$$\begin{array}{ccccccccc} x: & 1.0 & 1.2 & 1.4 & 1.6 & 1.8 & 2.0 & 2.2 \\ y: & 2.7183 & 3.3201 & 4.0552 & 4.9530 & 6.0496 & 7.3891 & 9.0250 \end{array}$$

[OR]

16. Find from the following table, the area bounded by the Curve and the  $x$  - axis from  $x = 7.47$  to  $x = 7.52$ .

$$\begin{array}{cccccc} x & : & 7.47 & 7.48 & 7.49 & 7.50 & 7.51 & 7.52 \\ f(x) & : & 1.93 & 1.95 & 1.98 & 2.01 & 2.03 & 2.06 \end{array}$$

17. Solve by Gauss elimination method.

$$x + 4y + 9z = 16$$

$$2x + y + z = 10$$

$$3x + 2y + 3z = 18$$

[OR]

18. Solve by matrix inversion method.

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

$$x + 2y + z = 4$$

19. If  $\frac{dy}{dx} = x - y^2$ ,  $y(0) = 1$  then find  $y(0.1)$  by Taylor series method.

[OR]

20. Using Modified Euler's method determine the value of  $y$  when  $x = 0.1$  given that  $y(0) = 1$  and  $y' = x^2 + y$ .

### SECTION – C (5 x 9= 45)

#### Answer all the Questions:

21. Use the Newton – Raphson method to find a root of the equation  $x^3 - 6x + 4 = 0$ .

[OR]

22. Find a real root of the equation  $x^3 - 4x + 1 = 0$  by the method of false position.

23. From the following table, find the value of  $f(1.17)$  using gauss forward formula.

$x$	: 1.00	1.05	1.10	1.15	1.20	1.25	1.30
$f(x)$	: 2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

[OR]

24. Use Stirlings formula to find  $U_{32}$  from the following data

$$U_{20} = 14.035 \quad U_{25} = 13.674 \quad U_{30} = 13.257$$

$$U_{35} = 12.734 \quad U_{40} = 12.089 \quad U_{45} = 11.309$$

25. Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at  $x = 0.6$  from the following data.

$x$ :	0.4	0.5	0.6	0.7	0.8
$y$ :	1.5836	1.7974	2.0442	2.3275	2.6511

[OR]

26. Evaluate  $I = \int_0^1 \frac{dx}{1+x}$  with  $h = 0.125$ , by Simpson's  $\frac{1}{3}$  rule.

27. Solve by Gauss – Seidel method.

$$10x - 5y - 2z = 3$$

$$4x - 10y + 3z = -3$$

$$x + 6y + 10z = -3$$

[OR]

28. Compute the inverse by gauss method.

$$A = \begin{vmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{vmatrix}$$

29. Given  $\frac{dy}{dx} = y - x$  where  $y(0) = 2$ , find  $y(0.1)$  and  $y(0.2)$  correct to four decimal places by R-K fourth order formula.

[OR]

30. Given  $\frac{dy}{dx} = 1 + y^2$  where  $y(0) = 0$ ,  $y(0.2) = 0.2027$ ,  $y(0.4) = 0.4228$ ,  $y(0.6) = 0.6841$ , find  $y(0.8)$  by Milne's method.

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