UG–732 **BCA–12**

B.C.A. DEGREE EXAMINATION — JUNE, 2018.

COMPUTER ORIENTED NUMERICAL METHODS

Time : 3 hours Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. Write a program to implement secant method.

2. Write a program to implement Regula-Falsi method.

3. Write a program to implement Gauss-Seidal method for finding the roots of linear equations.

4. In the following table, use the Newton Interpolation formula to find :

   (a) $f(2.4)$

   (b) $f(8.7)$

x :	2	4	6	8	10
$f(x)$:	9.68	10.96	12.32	13.76	15.28

5. Find the least-squares approximation of $f(x) = x^{1/3}$ on $[0,1]$ by a polynomial of degree at most.

6. Using Lagrange's interpolation formula find a second degree polynomial which passes through the points (0, 0), (1, 1) and (2, 20).

7. Solve using Euler's method : $\frac{dy}{dx} = \sin(x + y) - e^x \cdot y(0) = 4$.

PART B — ($5 \times 10 = 50$ marks)

Answer any FIVE questions.

8. Use the Newton method to find the smallest and the second smallest positive roots of the equation $\tan x = 4x$, correct to 4 decimal places.

9. Solve the following system by using the Gauss-Jordan elimination method :

$$\begin{aligned} x + y + z &= 5 \\ 2x + 3y + 5z &= 8 \\ 4x + 5z &= 2. \end{aligned}$$

10. Use the Gauss Seidal method to solve the system :

$$\begin{aligned} 4x_1 + x_2 - x_3 &= 3 \\ 2x_1 + 7x_2 + x_3 &= 19 \\ x_1 - 3x_2 + 12x_3 &= 31. \end{aligned}$$

11. Derive the Newton's forward interpolation formula with example.

12. Using Lagrange's interpolation formula, find from the following table :

x :	0	2	4	6
y :	–3	5	21	45

13. Evaluate $\int_{-3}^{3} x^4 \, dx$ by using :

    (a) Trapezoidal

    (b) Simpson's.

    Rule and verify your results by actual integration.

14. Using RK of order 4 to solve the following, using a step size of $h = 0.1$ for

$$0 \le x \le 1 \quad \frac{dy}{dx} = \frac{5x^2 - y}{e^{x+y}} \quad y(0) = 1 .$$