UG–725 BCA-12

B.C.A. DEGREE EXAMINATION – JUNE 2006.

Second Year

(For Candidates admitted in AY–2004–05 only)

COMPUTER ORIENTED NUMERICAL METHODS

Time : 3 hours Maximum marks : 60

PART A — ($4 \times 5 = 20$ marks)

Answer any FOUR questions.

1. Perform 3 iterations of fixed point iteration method to find the smallest positive root of the equation.

$x^2 - 3x + 1 = 0$ by starting at $x_0 = 0.5$.

2. Explain Jacobi's iterative method and sufficient condition for convergence of the Jacobi method.

3. What is Inverse Interpolation? Find the value of x when $y = 3$.

x	4	7	10	12
y	–1	1	2	4

4. Prove the uniqueness of the interpolating polynomial by applying suitable results.

5. Find Newton's backward difference form of interpolating polynomial for the data given below :

x	4	6	8	10
$f(x)$	19	40	79	142

Hence interpolate $f(9)$.

6. Discuss briefly the various types of errors that will arise in numerical calculation.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

7. Perform three iterations of second method to solve $x^3 + x - 6 = 0$. Starting with $x_0 = 1$ and $x_1 = 2$.

8. Find the iteration function $g(x)$ and corresponding interval to get the two roots 1 and 2 by fixed point iteration method for the equation $x^2 - 3x + 2 = 0$.

9. Solve the system of equations by Gauss elimination.

$$x_1 - x_2 + 2x_3 - x_4 = -8$$
$$2x_1 - 2x_2 + 3x_3 - 3x_4 = -20$$
$$x_1 + x_2 + x_3 + 0x_4 = -2$$
$$x_1 - x_2 + 4x_3 + 3x_4 = 4$$

10. Using forward differences show that the following data represents a third degree polynomial.

x	−3	−2	−1	0	1	2	3
$f(x)$	−29	−9	−1	1	3	11	31

Find the polynomial and obtain the value of $f(0.5)$.

11. (a) Explain interpolation and extrapolation.

(b) Discuss briefly Lagrange's form of interpolating polynomial.

12. (a) State intermediate value theorem.

(b) Find a root by Bisection method which lies between 0 and 1.

$$x^3 - 5x + 1 = 0.$$

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