GSM/D-22   **1172**

COMPUTER ORIENTED NUMERICAL METHODS
BCA-236

Time : Three Hours]   [Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

(Compulsory Question)

1. Attempt the following questions in short :   8×2=16

   (a) Explain Bairstow's method.

   (b) Define interpolation and approximation.

   (c) Discuss pitfalls in differentiation.

   (d) Discuss order of convergence of Newton-Raphson method.

   (e) Write the Taylor series formula.

   (f) Explain orthogonal properties of Chebyshev polynomial.

   (g) Explain the types of errors that occur in numerical computations.

   (h) Discuss Predictor Corrector method.

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Unit I

2. (a) How are floating point numbers represented in computer ? **8**

(b) Discuss Arithmetic operations with normalised floating point numbers. **8**

3. Explain the following Iterative methods :

(a) Newton-Raphson method **8**

(b) Bisection method. **8**

Unit II

4. (a) Explain algorithms of Gauss-Elimination methods for three equations. **8**

(b) Solve the following equations by Gauss elimination method : **8**

$$4x_1 + x_2 + 3x_3 = 11$$
$$3x_1 + 4x_2 + 2x_3 = 11$$
$$2x_1 + 3x_2 + x_3 = 7 .$$

5. Find y for $x = 0.1$ by using Euler's method : **16**

$$\frac{dy}{dx} = \frac{y-x}{y+x}, y = 1 \text{ at } x = 0 \text{ with initial condition.}$$

Unit III

6. Use Newton's formula for interpolation to find the net premium at age 25 from the table given ahead : **16**

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Age	20	24	28	32
Annual Net Premium	0.01427	0.01581	0.01772	0.01996

7. Explain Chebyshev polynomials. Prove the recursion relation $T_{n+1}(x) = 2x\,T_n(x) - T_{n-1}(x)$. Also find the first six Chebyshev ploynomials. **16**

Unit IV

8. Evaluate $\int_0^6 \dfrac{1}{1+x^2}\,dx$ by using :

   (i) Simpson's $\dfrac{1}{3}$ rule **8**

   (ii) Simpson's $\dfrac{3}{8}$ rule. **8**

9. Explain the following :
   (i) Numerical differentiation and integration **8**
   (ii) Gaussian quadrature. **8**

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