AM–223

B.C.A. Part–I (Semester–I) Examination
NUMERICAL METHODS – 1ST4

Time : Three Hours]   [Maximum Marks : 60

Note :   (1)   **ALL** questions are compulsory.

(2)   All questions carry equal marks.

1.   (a)   What do you mean by Numerical Computing ? Explain how you will formulate mathematical model in numerical computing.   4

(b)   Describe with the help of block diagram, the process of numerical computing.   4

(c)   Explain new trends in Numerical Computing.   4

OR

2.   (a)   What is Accuracy ? How is it affected during the process of numerical computing ?   4

(b)   Describe the various phases involved in numerical computing process.   4

(c)   Explain Digital computing.   4

3.   (a)   Explain the taxonomy of error in numerical computing.   4

(b)   Explain how you will approximate a number using rounding off rule.   4

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(c) Round off the following numbers to four significant figures :

    (i) .0063945

    (ii) 0.90038

    (iii) 12.345

    (iv) 0.16153.   4

OR

4. (a) How do mathematical models contribute to error in numerical computing ?   4

    (b) Explain the concept of truncation error with example.   4

    (c) Use zero to second order Taylor's series expansion to approximate the function :

$$f(x) = -0.1x^4 - 0.15x^3 - 0.5x^2 - 0.25x + 1.2.\qquad 4$$

5. (a) Explain how you will locate by using bisection method.   4

    (b) Use the false position repeatedly and obtain the root of the equation $\overline{x} \tan x - 1 = 0$.   8

OR

6. (a) What do you mean by algebraic equation and transcendental equation ? Give two examples.   4.

    (b) Find the root of an equation $e^{-x} - x = 0$ by using bisection method.   8

7. (a) State the Newton Raphson formula and explain how it is used to obtain real root of equation.   4

    (b) Find by Newton Raphson method, the root of the equation $\log x - \cos x = 0$.   4

(c) By using secant method find the root of the equation $f(x) = x \sin x - 1$.   4

OR

8. (a) State the formula to obtain real root of the equation by using secant method. Compare the secant iterative formula with Newton Raphson formula to estimate root of the equation.   4

    (b) Use the secant method to find the root of an equation $x^2 - 4x - 10 = 0$.   4

    (c) Explain the method of successive approximation to find a root of an equation $f(x) = 0$.   4

9. (a) Describe the two basic phases that are employed for solving a system of linear equations.   4

    (b) Solve the following system of equations by using Gauss Jordan method :

$$2x_1 - 3x_2 + 4x_3 = 8$$
$$x_1 + x_2 + 4x_3 = 15$$
$$3x_1 + 4x_2 - x_3 = 8.\qquad 8$$

OR

10. (a) Solve the following system of equations by using Gauss elimination with partial pivoting :

$$x_1 + x_2 + x_3 = 1$$
$$3x_1 + x_2 - 3x_3 = 5$$
$$x_1 - 2x_2 - 5x_3 = 10.\qquad 8$$

    (b) What are the pitfalls that occur in Gauss elimination method ?   4