Bachelor of Science (B.Sc. I.T.) Semester–IV (C.B.S.) Examination

NUMERICAL METHODS

Paper—VI

Time : Three Hours] [Maximum Marks : 50

Note :— (1) All questions are compulsory and carry equal marks.
(2) Assume suitable data wherever necessary.
(3) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) Discuss the following with example :
(i) Transcendental Equation
(ii) Polynomial Equation. 5

(b) Derive the false position formula for finding a root of equation. 5

OR

(c) Find the root of the quadratic equation $f(x) = x^3 - 2x - 5 = 0$ which lies between 2 and 3 by Bisection method. 5

(d) Find the roots of equation $f(x) = x^2 - 3x + 2$ in the vicinity of $x = 0$ using Newton Raphson method. 5

EITHER

2. (a) Explain the Matrix Inversion method, in detail. 5

(b) Solve the following system of equation using Gauss Elimination method :

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$ 5

OR

(c) Solve the system of equations by Gauss-Jordan method :

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$ 5

(d) Solve the following system of equations using Gauss Elimination method with partial pivoting :

$$x_1 + 2x_2 + 3x_3 = 8$$
$$2x_1 + 4x_2 + 9x_3 = 8$$
$$4x_1 + 3x_2 + 2x_3 = 2$$ 5

EITHER

3. (a) Derive the formula for linear interpolation. 5

(b) Fit a straight line to the data given below :

x :	2	3	4	7	8	9	5	5
y :	9	6	5	10	9	11	2	3

5

OR

(c) Use the method of least square to fit a curve of the form $y = ab^x$ to the following data :

x :	1	2	3	4
y :	4	11	35	100

5

(d) What is multiple linear regression ? Explain. 5

EITHER

4. (a) What is numerical integration ? Derive the formula for Trapezoidal Rule. 5

(b) Find the value of $\int_1^2 \frac{dx}{x}$ by using Simpson's 3/8 Rule where h = 0.25. 5

OR

(c) Give the initial value problem :

$\frac{dy}{dx} = y - x$ with y(0) = 2

Find y (0.1) and y (0.2) by using Runge-Kutta Second Order method. 5

(d) Solve $\int_0^6 \frac{dx}{1+x^2}$; using Simpson 1/3 Rule. Divide the interval into 6 subinterval. 5

5. Attempt **All** :

(a) Derive the formula for Secant method. 2½

(b) Explain the existence of solution for linear equations. 2½

(c) State whether the following piecewise polynomial is spline or not ?

$$f(x) = \begin{cases} x+1 & -1 \le x \le 0 \\ 2x+1 & 0 \le x \le 1 \end{cases}$$ 2½

(d) What is Gaussian Integration ? Explain. 2½