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 the data wherever necessary.

EITHER

1. (a) Derive false position formula for finding a root of equation. 5
(b) Obtain the root of equation cos x = 3x – 1 by using Newton Raphson method. 5

OR

(c) Derive the formula for second method to obtain real root of equation. 5
(d) Find the real root of equation $x^3 - x - 1 = 0$ by using Bisection method correct up to three decimal places. 5

EITHER

2. (a) Solve the following system of equations using Gauss-Jordan method :

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$ 5

(b) What is ill condition of system ? How will you improve it ? 5

OR

(c) Solve the following system of equations by using Gauss-Elimination method :

$$5x - 2y + z = 4$$
$$7x - y + 5z = 8$$
$$3x - 7y + 4z = 10$$ 5

(d) What is Pivoting ? Distinguish between complete pivoting and partial pivoting. 5

EITHER

3. (a) Obtain the normal equations for fitting a straight line by the principle of least squares regression. 5
(b) Find the Lagrange interpolation polynomial which agrees with the following data :

x	1.0	1.1	1.2
cos(x)	0.5403	0.4536	0.3624

Use it to estimate cos(1.15). 5

OR

(c) The table given below gives square root for integers. Using linear interpolation formula estimate the square root of 4.5 :

x	1	2	3	4	5
$f(x) = \sqrt{x}$	1	1.4142	1.7321	2	2.2361

5

(d) Given the data points

i	0	1	2
x_i	4	9	16
f_i	2	3	4

Estimate the function value f at x = 7 using cubic splines. 5

EITHER

4. (a) Derive formula for Simpson's 1/3 rule of Numerical Integration. 5

(b) Evaluate $\int_0^6 \frac{dx}{1+x}$ using Trapezoidal Rule taking h = 1. 5

OR

(c) Given the equation :

$\frac{dy}{dx} = 1 + y^2$, y(0) = 0 and h = 0.2

Estimate y(0.4) using Runge-Kutta fourth order method. 5

(d) Evaluate $\int_0^{\pi/2} \sqrt{\sin x}\, dx$ using Simpson's $3/8^{th}$ rule. 5

5. Attempt **ALL** :—

(a) What is transcendental equation ? Explain with examples. 2½

(b) Explain Matrix inversion method. 2½

(c) Explain, multiple linear Regression. 2½

(d) What is composite trapezoidal rule ? When do we use it ? 2½