# Bachelor of Science (B.Sc. I.T.) Semester-IV (C.B.S.) Examination <br> NUMERICAL METHODS <br> 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.
(b) Derive the false position formula for finding a root of equation.

## OR

(c) Find the root of the quadratic equation $f(x)=x^{3}-2 x-5=0$ which lies between 2 and 3 by Bisection method.
(d) Find the roots of equation $f(x)=x^{2}-3 x+2$ in the vicinity of $x=0$ using Newton Raphson method.

## EITHER

2. (a) Explain the Matrix Inversion method, in detail.
(b) Solve the following system of equation using Gauss Elimination method :

$$
\begin{aligned}
& 2 x+y+z=10 \\
& 3 x+2 y+3 z=18 \\
& x+4 y+9 z=16
\end{aligned}
$$

## OR

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

$$
\begin{aligned}
& 2 x+y+z=10 \\
& 3 x+2 y+3 z=18 \\
& x+4 y+9 z=16
\end{aligned}
$$

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

$$
\begin{aligned}
& x_{1}+2 x_{2}+3 x_{3}=8 \\
& 2 x_{1}+4 x_{2}+9 x_{3}=8 \\
& 4 x_{1}+3 x_{2}+2 x_{3}=2
\end{aligned}
$$

## EITHER

3. (a) Derive the formula for linear interpolation.
(b) Fit a straight line to the data given below :

| $\mathbf{x}:$ | 2 | 3 | 4 | 7 | 8 | 9 | 5 | 5 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathbf{y}:$ | 9 | 6 | 5 | 10 | 9 | 11 | 2 | 3 |

## OR

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

$\mathbf{x}:$| 1 | 2 | 3 | 4 |
| :--- | :--- | :--- | :--- | :--- |

$\mathbf{y ~ : ~} 4 \begin{array}{llll}11 & 35 & 100\end{array}$
(d) What is multiple linear regression ? Explain.
4. (a) What is numerical integration? Derive the formula for Trapezoidal Rule.
(b) Find the value of $\int_{1}^{2} \frac{\mathrm{dx}}{\mathrm{x}}$ by using Simpson's $3 / 8$ Rule where $\mathrm{h}=0.25$.

OR
(c) Give the initial value problem :
$\frac{d y}{d x}=y-x$ with $y(0)=2$
Find y (0.1) and y (0.2) by using Runge-Kutta Second Order method.
(d) Solve $\int_{0}^{6} \frac{\mathrm{dx}}{1+\mathrm{x}^{2}}$; using Simpson $1 / 3$ Rule. Divide the interval into 6 subinterval.
5. Attempt All :
(a) Derive the formula for Secant method.
(b) Explain the existence of solution for linear equations.
(c) State whether the following piecewise polynomial is spline or not?

$$
\mathrm{f}(\mathrm{x})= \begin{cases}\mathrm{x}+1 & -1 \leq \mathrm{x} \leq 0  \tag{1⁄2}\\ 2 \mathrm{x}+1 & 0 \leq \mathrm{x} \leq 1\end{cases}
$$

(d) What is Gaussian Integration ? Explain.

