AF-3120

BCA (Part - III)
Term End Examination, 2017-18

Paper - VII

Numerical Analysis

Time : Three Hours] [*Maximum Marks* : 100
[*Minimum Pass Marks* : 33

Note : Answer **all** questions. All questions carry equal marks.

1. Find a root of the following equation, using the Bisection method correct to three decimal places :

$$x^3 - x - 11 = 0$$

OR

Using Regula-Falsi method, find the real root of the following equation correct to four decimal places :

$$x^4 - x - 10 = 0$$

2. Solve the equation, using Gauss-Jordan method :

$$x + 4y - z = -5$$
$$x + y - 6z = -12$$
$$3x - y - z = 4$$

OR

Find the eigenvalues and eigenvectors of the matrix

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}.$$

3. The following table gives the values of x and y :

x	1.2	2.1	2.8	4.1	4.9	6.2
y	4.2	6.8	9.8	13.4	15.5	19.6

Find the value of x corresponding to $y = 12$, using Lagrange's formula.

OR

Find the cubic polynomial which takes the following values :

x	0	1	2	3
$f(x)$	1	2	1	10

Hence or otherwise evaluate $f(4)$.

(Continued)

4. Given that :

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$.

OR

Apply Simpson's $\frac{1}{3}$ rule to evaluate $\int_1^4 \frac{dx}{x}$ using six sub-interval and hence find an approximate value of $\log_e 4$.

5. Apply Runge-Kutta method to find an approximate value of y when $x = 0.2$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.

OR

Apply Milne's method to find a solution of the differential equation $\frac{dy}{dx} = x - y^2$ in the range $0 \leq x \leq 1$ with $y(0) = 0$. (Take $h = 0.2$)