University of Engineering & Management, Kolkata

Even Semester Term- I Examination, March, 2021

Course: B.Tech (CS) **Semester: IV**

Paper Name: Mathematics & Statistics - IV

Paper Code: BSC401

Full Marks: 70 **Time: 2 hours**

Answer all questions. Each question is of 10 marks.

1. A) Solve the following system by Gauss-Elimination method

$$x + 3y + 2z = 5$$
$$2x - y + z = -1$$
$$x + 2y + 3z = 2$$

OR

B) Find a root of the equation $x \sin x + \cos x = 0$ using Newton-Raphson method correct up to 5 places of decimal.

2. A) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's 1/3rd rule, taking 6 equal sub-intervals.

OR

B) $\frac{dy}{dx}$=y(1+x^2) ,y (0)=1 find y(0.6) taking h=0.2 by Euler method .

3. A) Evaluate $\int_0^1 e^{-x^2} dx$ by using trapezoidal rule using n=6.

OR

B) Use Modified Euler's method to find the value of $y(0.02)$ by taking $h = 0.01$ of the differential equation $\frac{dy}{dx} = x^2 + y$, given that $y(0) = 1$.

4. A) Find the value of $y(0.4)$ using Runge-Kutta method of fourth order with $h = 0.2$, given that $\frac{dy}{dx} = \sqrt{x^2 + y}$, $y(0) = 0.8$.

OR

B) Solve the following system by Gauss-Seidel method

$$8x_1 + 2x_2 - 2x_3 = 8,\ x_1 - 8x_2 + 3x_3 = -4,\ 2x_1 + x_2 + 9x_3 = 12,$$

Correct up to 2 decimal places.

5. **A)** Find the value of $\int_0^{\frac{\pi}{2}} \sqrt{\sin x}\ dx$, taking n=8 , correct upto 5 significant figure using Trapezoidal rule.

OR

B) Find the smallest positive real root of the equation x^x+2x-6=0 correct by Newton-Raphson method correct to 4significant figures.

6. **A)** Solve the following system of equation by LU decomposition method correct to 2 decimal places:

$$\mathbf{4x + 2y + z = 14}\ ; \qquad \mathbf{x + 5y - z = 10}\ ; \qquad \mathbf{x + y + 8z = 20}$$

OR

B) Find the root of $x^6 + x^4 + x^2 - 1 = 0$, which lies between 1.4 and 1.5, by Newton-Raphson Method, correct to three decimal places.

7. **A)** Find out the root of the following equation using Regula-falsi method

$x^3 - 5x - 7 = 0$ that lies between 2 and 3, correct to 4 decimal places.

OR

B) Solve: $\frac{dy}{dx} = \frac{-y^2}{1+x}$, $y(0) = 1$ by modified Euler's method to compute $y(0.6)$ with step length 0.1.