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Assignment-2

Subject: Mathematics-III

(BT-401)

(Common to CS/IT/EX/EE)

Topic: Numerical Methods-2

1. Find the $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 4$:

x:	1	2	4	8	10
y:	0	1	5	21	27

2. Find the $\frac{dy}{dx}$ at $x = 1.5$ from the following table:

x:	1.5	2.0	2.5	3.0	3.5	4.0
y:	3.375	7.0	13.625	24.0	38.875	59.0

3. Evaluate by Simpson's $\frac{1}{3}$ rule and after finding the true value of the integral, compare it with exact value.

(i) $\int_4^{5.2} \log_e x \, dx$: by dividing into seven ordinates (ii) $\int_0^{0.6} e^{-x^2} \, dx$ (iii) $\int_0^{\pi/2} \sin x \, dx$

4. Find $\int_0^1 \frac{1}{1+x^2} dx$ by Trapezoidal rule, Simpson's $\frac{1}{3}$ rule, Simpson's $\frac{3}{8}$ rule, where the interval is divided into 6 equal parts.

5.. Evaluate $\int_{0.5}^{0.7} x^{1/2} e^{-x} dx$, approximately by using a suitable formula.

6. Find an approximate value of $\log 5$ by calculating to four decimal places, by Simpson's $\frac{1}{3}$ rule, $\int_0^5 \frac{dx}{4x+5}$ dividing the range into 10 equal parts.

7. Evaluate $\int_0^{\pi/2} \sqrt{\cos \theta} d\theta$ by dividing into 6 equal parts. Using Simpson's $\frac{1}{3}$ rule

8. A river is 80meters wide. The depth d (in meters) of the river at a distance x from the bank is given by the following table:

x:	0	10	20	30	40	50	60	70	80
d:	0	4	7	9	12	15	14	8	3

Find approximately the area of cross section of river.

9. Solve the following system by Gauss-Elimination method.

$$2x - y + 3z = 9$$

(i) $x + y + z = 6$

$$x - y + z = 2$$

$$10x + y + 2z = 13$$

(ii) $3x + 10y + z = 14$

$$2x + 3y + 10z = 15$$

10. Apply Gauss-Jordan Method:

$$10x + y + z = 12$$

(i) $2x + 10y + z = 13$

$$x + y + 5z = 7$$

$$10x + y + z = 9$$

(ii) $x + 10y + z = 12$

$$x + y + 10z = 12$$

11. Solve by Crouts- Triangularization method:

$$10x + y + z = 12$$

(i) $2x + 10y + z = 13$

$$2x + 2y + 10z = 14$$

$$3x + 2y + 7z = 4$$

(ii) $2x + 3y + z = 5$

$$3x + 4y + z = 7$$

12. Solve by Jacobi's iteration method, the equations:

$$20x + y - 2z = 17$$

(i) $3x + 20y - z = -18$

$$2x - 3y + 20z = 25$$

$$10x - 5y - 2z = 3$$

(ii) $4x - 10y + 3z = -3$

$$x + 6y + 10z = -3$$

13. Solve the following system by Gauss-Seidel method:

$$27x + 6y - z = 85$$

(i) $6x + 15y + 2z = 72$

$$x + y + 54z = 110$$

$$10x + 2y + z = 9$$

(ii) $-2x + 3y + 10z = 22$

$$x + 10y - z = -22$$

14. Solve the following system by relaxation method:

$$3x + 9y - 2z = 11$$

$$4x + 2y + 13z = 24$$

$$4x - 4y + 3z = -8$$

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