

1. (i) Fit a straight line to the data given below. Also estimate the value of y at x = 2.5.

| | | | | | |
|---|---|-----|-----|-----|-----|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 1 | 1.8 | 3.3 | 4.5 | 6.3 |

(10 marks)

- (ii) Fit a parabola to the data given below. Also estimate the value of y at x = 6.
(10 marks)

| | | | | | |
|---|---|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 |
| y | 5 | 12 | 26 | 60 | 97 |

OR

2. (i) From the data given below, find the best values of a and b in the law $y = ae^{bx}$ by the method of least squares. (10 marks)

| | | | | | |
|---|---|-----|---|------|------|
| x | 0 | 5 | 8 | 12 | 20 |
| y | 3 | 1.5 | 1 | 0.55 | 0.18 |

- (ii) Fit a curve of the form $y = ax^b$ to the data: (10 marks)

| | | | | | | |
|---|------|-----|-----|-----|-----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 |
| y | 1200 | 900 | 600 | 200 | 110 | 50 |

3. Solve the system of equations $x + 2y + z = 3$, $2x + 3y + 3z = 10$, $3x - y + 2z = 13$ by (a) Gauss Elimination method and (b) Gauss Jordan method.

OR

4. Solve the system of equations $27x + 6y - z = 85$, $6x + 15y + 2z = 72$, $x + y + 54z = 110$ by (a) Gauss Jacobi method and (b) Gauss Seidel method.

5. (i) Find the 7th term of the sequence 2, 9, 28, 65, 126, 217 and also find the general term
(7 marks)

- (ii) Find the values of y at x = 21 and x = 28 from the following data using Newton's forward and backward interpolation formula. (13 marks)

| | | | | |
|---|--------|--------|--------|--------|
| x | 20 | 23 | 26 | 29 |
| y | 0.3420 | 0.3907 | 0.4384 | 0.4848 |

OR

6. (i) Using Lagrange's formula of interpolation find $y(9.5)$ given (10 marks)

| | | | | |
|---|---|---|---|----|
| x | 7 | 8 | 9 | 10 |
| y | 3 | 1 | 1 | 9 |

- (ii) Find the age corresponding to the annuity value 13.6 from the following table using inverse Lagrange's formula. (10 marks)

| | | | | | |
|-------------------|------|------|------|------|------|
| Age (x) | 30 | 35 | 40 | 45 | 50 |
| Annuity value (y) | 15.9 | 14.9 | 14.1 | 13.3 | 12.5 |

7. (i) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule with $h = 0.2$. Hence obtain an

approximate value of π . Can you use other formulae in this case. (10 marks)

- (ii) Evaluate $\int_{-3}^3 x^4 dx$ by using Simpson's rule (both) with $h = 1$. Verify your results by actual integration. (10 marks)

OR

8. (i) Using Euler's method, solve numerically the equation $y' = x + y$, $y(0) = 1$ for $x = 0.2, 0.4, 0.6, 0.8$ and 1 . (10 marks)

- (ii) Solve $\frac{dy}{dx} = x + y$, $y(1) = 0$ and get $y(1.1)$ and $y(1.2)$ by Taylor series method. (10 marks)

9. Obtain the values of y at $x = 0.1, 0.2$ using Runge-Kutta method of (a) second order and (b) fourth order for the differential equation $y' = -y$, given $y(0) = 1$.

Wishing you All the Best
