



7. \_\_\_\_\_ formula is used to find the unknown values of 'y' for some x which lies at the end of the tabular values
- (a) Newton's Forward (b) Lagrange's  
(c) Newton's divided difference (d) Newton's Backward
8. \_\_\_\_\_ formula is used to find the unknown values of 'y' for some x which lies at the end of the tabular values
- (a) Newton's Forward (b) Lagrange's  
(c) Newton's divided difference (d) Newton's Backward
9. Simpson's 1/3<sup>rd</sup> rule is used only when the number of ordinates must be
- (a) Even (b) odd (c) Multiple of three (d) None of these
10. Two point Gaussian Quadrature formula is  $\int_{-1}^1 f(x)dx =$
- (a)  $f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$  (b)  $f(-\sqrt{3}) + f(\sqrt{3})$   
(c)  $f(-1) + f(1)$  (d) None of these

PART - B (5 x 2 = 10 Marks)

11. Define Type-I error and Type-II error.
12. Write the differences between RBD and LSD.
13. Solve the following system of equations, using Gauss - Jordan elimination method  
 $2x + y = 3, x - 2y = -1.$
14. What is the assumption we make when Lagrange's formula is used?
15. Find the area under the curve passing through the points (0, 0), (1, 2), (2, 2.5), (3, 2.3), (4, 2), (5, 1.7) and (6, 1.5).

PART - C (5 x 16 = 80 Marks)

16. (a) A real estate agency wants to compare the appraised values of single-family homes in two cities in Michigan. A sample of 60 listings in Lansing and 99 listings in Grand Rapids yields the following results (in thousands of dollars):

|           | Lansing | Big Rapids |
|-----------|---------|------------|
| $\bar{X}$ | 191.33  | 172.34     |
| S         | 32.60   | 16.92      |
| n         | 60      | 99         |

Is there evidence of a significant difference in the average appraised values for single-family homes in the two Michigan cities? Use 0.05 level of significance. (16)

Or

- (b) (i) A sample of 26 bulbs gives a mean life of 990 hours with a standard deviation of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not up to the standard? (8)
- (ii) A sample of size 13 gave an estimated population variance of 3.0, while another sample of size 15 gave an estimate of 2.5, could both samples from populations with the same variance? (8)

17. (a) Five doctors, each test five treatments for a certain disease and observe the number of days each patient takes to recover. The results are as follows:  
Given Recovery time in days.

| Doctors | Treatments |    |    |    |    |
|---------|------------|----|----|----|----|
|         | 1          | 2  | 3  | 4  | 5  |
| A       | 10         | 14 | 23 | 19 | 20 |
| B       | 11         | 15 | 24 | 17 | 21 |
| C       | 9          | 12 | 20 | 16 | 19 |
| D       | 8          | 13 | 17 | 17 | 20 |
| E       | 12         | 15 | 19 | 15 | 22 |

Discuss the significant difference between (i) doctors (ii) treatments. (16)

Or

- (b) Analyze the following results of Latin square experiments

|   | 1     | 2     | 3     | 4     |
|---|-------|-------|-------|-------|
| 1 | A(12) | D(20) | C(16) | D(10) |
| 2 | D(18) | A(14) | B(11) | C(14) |
| 3 | B(12) | C(15) | D(19) | A(13) |
| 4 | C(16) | B(11) | A(15) | D(20) |

The letters A, B, C, D denote the treatments and the figures in brackets denote the observations. (16)

18. (a) (i) Using Newton - Raphson method, solve  $x \log_{10} x = 12.34$  taking the initial value  $x_0$  as 10. (8)
- (ii) Solve by Gauss - elimination method the following system  
 $3x + 4y + 5z = 18$ ;  $2x - y + 8z = 13$ ;  $5x - 2y + 7z = 20$ . (8)

Or

((b) Solve the following system of equations using Gauss Seidel iterative method:

$$27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110. \quad (16)$$

19. (a) Using Newton's forward interpolation formula, find the polynomial  $f(x)$  satisfying the following data. Hence evaluate  $f(x)$  at  $x = 5$ . (16)

$$\begin{array}{l} x \quad : \quad 4 \quad 6 \quad 8 \quad 10 \\ f(x) : \quad 1 \quad 3 \quad 8 \quad 10 \end{array}$$

Or

(b) (i) Using Lagrange's interpolation formula, find  $y(10)$  from the following table. (8)

|   |    |    |    |    |
|---|----|----|----|----|
| x | 5  | 6  | 9  | 11 |
| y | 12 | 13 | 14 | 16 |

(ii) Using Cubic Spline, find  $y(0.5)$  and  $y'(1)$  given  $M_0 = M_2 = 0$  and the table (8)

|   |    |    |   |
|---|----|----|---|
| x | 0  | 1  | 2 |
| y | -5 | -4 | 3 |

20. (a) (i) By dividing the range into 10 equal parts, evaluate  $\int_0^{\pi} \sin x \, dx$  by Trapezoidal rule. (8)

(ii) Evaluate  $\int_{-1}^1 \frac{x^2}{1+x^4} dx$  by using three points Gauss quadrature formula. (8)

Or

(b) Evaluate  $\int_{1.2}^{1.4} \int_2^{2.4} \frac{1}{xy} dx dy$  using Trapezoidal and Simpson's rule. Verify your result by actual integration. (16)