



ADITYA DEGREE COLLEGES

ANDHRA PRADESH

IV SEM - MID-I EXAMINATIONS 2025

Subject: Numerical Analysis (Statistics Minor)

DATE: 10.02.2025

TIME: 3 HRS

MAX MKS: 60 M

SECTION - A

Answer Any Five from the following questions

5 x 4 = 20M

1. Prove that i) $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1 + \frac{\delta^2}{4}}$ ii) $\mu^2 = 1 + \frac{1}{4}\delta^2$

2. Interpolate the missing terms in the following data

| | | | | | | |
|---|---|---|---|----|---|----|
| x | 0 | 1 | 2 | 3 | 4 | 5 |
| y | 0 | - | 8 | 15 | - | 35 |

3. Find the function whose first difference is $9x^2 + 11x + 5$

4. Find the cubic polynomial which takes the following values

| | | | | |
|------|---|---|---|----|
| x | 0 | 1 | 2 | 3 |
| f(x) | 1 | 2 | 1 | 10 |

5. Apply Everett's formula, to find the value of $y_{2.73}$, given that $y_{2.5}=0.4938, y_{2.6}=0.4953, y_{2.7}=0.4965, y_{2.8}=0.4974, y_{2.9}=0.4981, y_{3.0}=0.4987$.

6. Use Gauss formula to find $f(2.5)$ using the following table

| | | | | |
|------|---|---|----|----|
| x | 1 | 2 | 3 | 4 |
| F(x) | 1 | 8 | 27 | 64 |

7. Define different types of operators

8. Evaluate $\frac{\Delta^2 x^3}{Ex^3}$

SECTION - B

Answer All questions from the following

4x 10 = 40M

9. a) State and prove fundamental theorem on finite differences

(OR)

- b) From the following table of half yearly premium for policies at different ages, estimate the premium for policies at the age of 63.

| | | | | | |
|------------|--------|-------|-------|-------|-------|
| Age(x) | 45 | 50 | 55 | 60 | 65 |
| Premium(y) | 114.84 | 96.16 | 83.32 | 74.48 | 68.48 |

10. a) State and prove Gauss Backward Interpolation formula

(OR)

- b) Use Stirling's formula to interpolate the value of y when $x=1.91$ from the following table

| | | | | | | |
|---|--------|--------|--------|--------|--------|--------|
| X | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 |
| Y | 5.4739 | 6.0496 | 6.6859 | 7.3891 | 8.1662 | 9.0250 |

11. a) Compute U_{32} by using Bessel's formulae Given $U_{20}=14.035, U_{25}=13.674, U_{30}=13.257, U_{35}=12.734, U_{40}=12.089, U_{45}=11.309$

(OR)

- b) State and prove Newton's forward Interpolation formula.

12. a) State and prove Bessel's difference formula

(OR)

- b) Evaluate $\Delta^n \sin(ax+b)$