

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.

B.Sc.Statistics - END SEMESTER EXAMINATIONS - APRIL 2025

SEMESTER - IV

20USTAT4004 - Numerical Methods

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. Find the cubic polynomial which takes the following values:

$$y(1) = 24, y(3) = 120, y(5) = 336, \text{ and } y(7) = 720$$

Hence obtain the value of $y(8)$.

2. Find the Lagrange's interpolating polynomial of degree 2 approximating the function $y = \log x$ defined by the following table of values. Hence determine the value of $\log 2.7$.

X	2	2.5	3.0
Y=log x	0.69315	0.91629	1.09861

3. Find the third divided difference given that

X	1	2	4	7	12
Y	22	30	82	106	216

4. Find the smallest positive root of the equation $x^3 - 2x + 0.5 = 0$ using Newton Raphson's method.

5. Using Simpson's $\frac{3}{8}$ rule, find $\int_0^6 \frac{1}{1+x} dx$.

6. Derive Bessel's difference Formula.

7. Use Newton's formula for interpolation to find the net premium at age 25 from the table given below

Age	20	24	28	32
Annual net Premium	0.01427	0.01581	0.01772	0.01996

8. Prove that (a) $(1 + \Delta)(1 - \nabla) \equiv 1$. (b) Show that $E\Delta \equiv \Delta E$.

Contd...

Section C

Answer any **THREE** questions ($3 \times 10 = 30$ Marks)

9. From the following table of values of x and $f(x)$ determine $f(0.23)$

x	0.20	0.22	0.24	0.26	0.28	0.30
y	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

10. By means of Newton's divided difference formula find the value of $f(8)$ and $f(15)$ from the following table

X	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

11. From the table following table find the value of e^x when $x = 0.638$, using Stirling's and Bessel's formulae.

x	0.61	0.62	0.63	0.64	0.65	0.66	0.67
Y=e^x	1.840431	1.858928	1.877610	1.896481	1.915541	1.934792	1.954237

12. Solve: $x + \frac{1}{2}y + \frac{1}{3}z = 1,$

$$\frac{1}{2}x + \frac{1}{3}y + \frac{1}{4}z = 0,$$

$$\frac{1}{3}x + \frac{1}{4}y + \frac{1}{5}z = 0,$$

by Gauss Elimination method.

13. Use Trapezoidal rule to evaluate the approximate values of the following definite integrals

(a) $\int_1^7 f(x)dx$, given that

X	1	2	3	4	5	6	7
f(x)	2.105	2.808	3.614	4.604	5.857	7.451	9.467

(b) $I = \int_0^1 \frac{dx}{1+x}$ correct to 3 decimals, taking $.h = 0.25$.
