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. Show that $e^x \left(u_0 + x\Delta u_0 + \frac{x^2}{2!}\Delta^2 u_0 + ... \right) = u_0 + u_1 x + u_2 \frac{x^2}{2!} + ...$

2. From the following table, Estimate the value of e^x when $x = 0.638$, using Stirling formula

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

3. Compute a real root of the equation $x \sin x + \cos x = 0$, using Newton - Raphson Method.

4. Find, from the following table, the area bounded by the curve and the x-axis from $x = 7.47$ to $x = 7.52$

x	7.47	7.48	7.49	7.50	7.51	7.52
f(x)	1.93	1.95	1.98	2.01	2.03	2.06

5. The population of a town in the decennial census was as given below. Estimate the population for the year 1895.

Year x	1891	1901	1911	1921	1931
Population y (in thousands)	46	66	81	93	101

6. From the following table, Estimate the value of $e^{1.17}$ using Gauss's forward formula:

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
e^x	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

7. Solve the equations $3x + y + 2z = 3$; $2x - 3y - z = -3$; $x + 2y + z = 4$. By using Gauss elimination method.

Contd...

8. A solid of revolution is formed by rotating about the x-axis the area between the x-axis, the lines $x = 0$ and $x = 1$, and a curve through the points with the following coordinates

x	0.00	0.25	0.50	0.75	1.00
y	1.0000	0.9896	0.9589	0.9089	0.8415

Determine the volume of the solid formed, giving the answer to three decimal places.

Section C

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

9. The table below gives the values of tan x for $0.10 \leq x \leq 0.30$.

x	0.10	0.15	0.20	0.25	0.30
y = $\tan$ **x**	0.1003	0.1511	0.2027	0.2553	0.3093

Find i) $\tan 0.12$ ii) $\tan 0.26$ iii) $\tan 0.40$ iv) $\tan 0.50$.

10. Using Lagrange's interpolation formula, Compute the form of the function $f(x)$ from the following table

x	0	1	3	4
y	-12	0	12	24

11. Formulate the table for $y = e^{-x}$, at x=1.72, 1.73, 1.74, 1.75, 1.76, 1.77, 1.78 Determine the value of y when $x = 1.7475$ using Bessel's and Everett's formula.
12. Solve a real root of the equation x^3-$2x$-5=0, Using Bisection methods.
13. Evaluate $I = \int_0^1 \frac{dx}{1+x}$, correct to three decimal places by both Trapezoidal and Simpson's rules with h=0.5, 0.25 and 0.125 respectively.

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