

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.CSc.(CGS) - END SEMESTER EXAMINATIONS - APRIL 2025

SEMESTER - II

21UCGAT2002 - Numerical Methods

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

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

- Using Regula Falsi method determine a root of $2e^x \sin x = 3$ and correct it to three decimal places with three iterations.
- Prove (i) $\Delta \equiv E - 1$ (ii) $\lambda \equiv (E - 1)/E$.
- Construct a table of divided difference for the following data:

x	1	2	7	8
f(x)	1	5	5	4

- Using Lagrange's Interpolation formula determine the value of $x = 3$ when it passes through the points $(0, 0)$, $(1, 1)$ and $(2, 20)$.
- Determine first and second derivatives at $x = 1.5$ for the following data.

x	1.5	2	2.5	3	3.5	4
f(x)	3.375	7	13.625	24	38.875	59

- Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule with $h = 0.2$.
- Given $\frac{dy}{dx} = x^2y - 1$ and $y(0) = 1$; determine the value of $y(0.1)$ using Taylor's Series Method.
- Consider below the differential equation $\frac{dy}{dx} = x + y + xy$ with initial condition $y(0) = 1$ determine $y(1)$ with $h = 0.025$ using Euler's method.

Section C

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

- Evaluate $\sqrt{12}$ to four decimal places by Newton's -Raphson Method.

Contd...

10. The following table gives the population of a town during the last six censuses. Estimate using Newton's interpolation formula, the increase in the population during the period 1946 to 1948.

Year	1911	1921	1931	1941	1951	1961
Population (in thousands)	12	13	20	27	39	52

11. Using Lagrange's Interpolation formula calculate $f(3)$ from the following table

x	0	1	2	4	5	6
f(x)	1	14	15	5	6	19

12. Evaluate $\int_4^{5.2} \log x dx$ by dividing the range of integration into 6 equal parts using

(i) Trapezoidal rule (ii) Simpson's 1/3rd rule (iii) Simpson's 3/8th rule.

13. Use Runge-Kutta method to approximate y , when $x = 0.1, 0.2, h = 0.1$ given $x = 0$ when $y = 1$ and $\frac{dy}{dx} = x + y$.
