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.CGS - END SEMESTER EXAMINATIONS - NOV'2024
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)

1. Find the real root of x^3 - 3x + 1 = 0 lying between 1 and 2 upto three decimal places by Newton Raphson method.
2. Find the real root of the equation cos x = 3x - 1 correct to four decimal places using successive approximation method.
3. If $u_1 = 1$, $u_3 = 17$, $u_4 = 43$, $u_5 = 89$; Determine u_2?
4. Given $u_0 = 2$, $u_1 = 11$, $u_2 = 80$, $u_3 = 200$, $u_4 = 100$, $u_5 = 8$; Calculate $\nabla^5 u_5$ without constructing the difference table.
5. If y(75) = 246, y(80) = 202, y(85) = 118, y(90) = 40; Compute y(79)?
6. Use Lagrange's formula to find the value of y at x = 6 from the data:

x	3	7	9	10
y	168	120	72	63

7. Evaluate by using Trapezoidal rule and Simpson one-third rule $\int_0^{10} \frac{dx}{1+x^2}$
8. The velocity v of a particle at distance s from a point on its path is given by the table below

s (metres)	0	10	20	30	40	50	60
v (m/sec)	47	58	64	65	61	52	38

Estimate the time taken to travel 60 metres by using Simpson's $1/3^{rd}$ rule.

Section C

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

9. Find a real root of the equation x^3 -x -11 = 0 by using bisection method.

Contd...

10. Estimate the missing term in the following table:

x	0	1	2	3	4
U(x)	1	3	9	?	81

Explain why the resulting value differs from 3^3.

11. The following data gives the melting point of an alloy of Zinc and lead, θ is the temperature and x is the percentage of lead. Using Newton's interpolation formula find (i) θ when x $= 48$ (ii) θ when x $= 84$ from

x	40	50	60	70	80	90
θ	184	204	226	250	276	304

12. The population of a certain town is shown in the following table

Year (x)	1931	1941	1951	1961	1971
Population (y)	40.62	60.80	79.95	103.56	132.65

Determine the rate of growth of the population in 1961?

13. Evaluate $\int_0^1 \frac{dx}{1+x}$ using

i) Trapezoidal rule
ii) Simpson's $1/3^{rd}$ Rule
iii) Simpson's $3/8^{th}$ rule
iv) Find the error in each method by comparing with the actual integration upto 4 places of decimals. (Take h $= 1/6$ for all cases)

*****