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.(Maths) END SEMESTER EXAMINATIONS NOVEMBER -2023
SEMESTER - V
20UMAET5001 - 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 xe^x - 2 = 0 correct to three places of decimals using Newton-Raphson method.
2. State and prove fundamental theorem for finite differences.
3. Prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$
4. Derive the form of the function y for the following data. Hence find y(3).

x	0	1	2	5
y	2	3	12	147

5. If y(75)=246, y(80)=202, y(85)=118, y(90)=40. Calculate y(79).
6. Evaluate $\int_0^{\frac{\pi}{2}} sinx \ dx$ by Simpson's $\frac{1}{3}$ rule dividing the range into six equal parts.
7. Use Taylor's method to solve the equation $y' = x^2 + y^2$ for $x = 0.25$ and $x = 0.5$ given $y(0) = 1$.
8. Use Euler's method to solve $y(0.2)$ with $h = 0.1$ for $y' = x(y + 1), y(0) = 1$.

Section C

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

9. Obtain a real root of the equation x^3 - $3x + 1 = 0$ lying between 1 and 2 correct to three places of decimal by using bisection method.
10. Solve the following system of equations using Gauss Seidel iteration method.
    $10x + 2y + z = 9, \quad x + 10y - z = -22, \quad -2x + 3y + 10z = 22.$
11. Tabulate $y = x^3$ for x = 2,3,4,5 and determine the cube root of 10 correct to three decimal places.

Contd...

12. Evaluate $\int_0^1 \frac{dx}{1+x}$ Using
    (i) Trapezoidal rule
    (ii) Simpson's $\frac{1}{3}$ rule
    (iii) Simpson's $\frac{3}{8}$ rule
    (iv) Find the error in each method by comparing with the actual integration upto 4 places of decimals. Take $h = \frac{1}{6}$ for all cases.

13. Given $y' = x^3 + y$, $y(0) = 2$ the values $y(0.2) = 2.073$, $y(0.4) = 2.452$, $y(0.6) = 3.023$ are got by Runge kutta method of fourth order. Determine $y(0.8)$ by Milne's predictor corrector method taking $h = 0.2$

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