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 APRIL-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. Evaluate $\sqrt{142}$ to four decimal places by Newton's Raphson method.
2. Using Newton's forward interpolation formula find the value of y at $x = 21$.

X	20	23	26	29
Y	0.3420	0.3907	0.4384	0.4848

3. From the following table obtained the values of $\frac{d^2y}{dx^2}$ at the point x = 0.96.

x	0.96	0.98	1.00	1.02	1.04
f(x)	0.7825	0.7739	0.7651	0.7563	0.7473

4. Using Euler's method find y(0.1) with h = 0.1 from $\frac{dy}{dx}$ = y - $\frac{2x}{y}$, y(0) = 1.
5. Prove that $\nabla = 1 - E^{-1}$ and $E = 1 + \Delta$.
6. Find $f(1)$ and $f(5)$ using Newton's divided difference formula from the following data.

x	0	2	3	4	7	8
f(x)	4	26	58	112	466	668

7. Evaluate $\int_0^1 \frac{dx}{1+x^2}$, using Trapezoidal rule with h = 0.2. Hence find the value of π .
8. Using Adam's method find y(0.4) given $\frac{dy}{dx}=\frac{xy}{2}$, $y(0) = 1$, $y(0.1) = 1.01$, $y(0.2) = 1.022$, $y(0.3) = 1.023$.

Section C

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

9. Find the positive root of $x^3 - 3x + 1 = 0$ correct to three places of decimals by using Newton-Raphson method.

Contd...

10. Solve by Gauss-Seidel iteration method :
$$8x - y + z = 18 \; ; \; 2x + 5y - 2z = 3 \; ; \; x + y - 3z + 6 = 0.$$

11. Given: $\log_{10}300 = 2.4771$, $\log_{10}304 = 2.4829$, $\log_{10}305 = 2.4843$, $\log_{10}307 = 2.4871$. Using Lagrange's formula find $\log_{10}301$.

12. Find the value of $\log 2^{\frac{1}{3}}$ from $\int_0^1 \frac{x^2}{1+x^3}dx$ using Simpson's one-third rule with $h = 0.25$.

13. Using Taylor's series method, compute the value of $y(0.2)$ correct to 3 decimal places from $\frac{dy}{dx} = 1 - 2xy$, given that $y(0) = 0$.

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