B.Sc. DEGREE EXAMINATION,NOVEMBER 2019
III Year V Semester
Numerical Methods

Time : 3 Hours   **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Define Algebraic and transcendental equation. Give an example.

2. Write the condition for convergence of Newton's Raphson method.

3. Construct a Backward difference table, given.

x	x_0	x_1	x_2	x_3
y	y_0	y_1	y_2	y_3

4. Prove that $E = 1 + \Delta$.

5. State Newton's Backward difference interpolation formula.

6. Write the Lagrange's inverse interpolation formula.

7. Write the Simpson's $\left(\dfrac{3}{8}\right)^{th}$ Rule.

8. What are the errors in Trapezoidal rule of numerical integration.

9. Write Milne's predictor -Correction formula.

10. Solve $\dfrac{dy}{dx} = 1 - y$, y(0) = 0 for x = 0.1 by Euler's method.

11. Define shift operator.

12. Solve $\dfrac{dy}{dx} = e^x - y$, y(0) = 0, by Picard's method.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

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

14. Solve by Gauss − Seidel iteration method : $x - 2y = -3$, $2x + 25y = 15$.

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

16. Find the first, second and third derivatives of the function tabulated below at the point x = 1.5.

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.0	13.625	24.0	38.875	59.0

17. Find the values of y(0.1) correct to four decimal place from $\dfrac{dy}{dx} = x^2 - y$, y(0) = 1 with $h = 0.1$ by using Taylor's series method.

18. Evaluate $\displaystyle\int_0^1 \dfrac{dx}{1+x^2}$, using Trapezoidal rule with h = 0.2. Hence find the value of π.

19. Using Adam's method find y(0.4) given $\dfrac{dy}{dx} = \dfrac{xy}{2}$, y(0) = 1, y(0.1) = 1.01, y(0.2) = 1.022, y(0.3) = 1.023.

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Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

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20. Find the positive root of $x^3 - 2x - 5 = 0$ correct to three places of decimals by using False Position method

21. Solve by Gauss-elimination method : $3x + y - z = 3$; $2x - 8y + z = -5$; $x - 2y + 9z = 8$.

22. Find $f(9)$ using Newton's divided difference formula for the following table.

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

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

24. Using Range-Kutta method to approximate y, when x = 0.1, 0.2, 0.3, h = 0.1 given x = 0 when y = 1 and $\dfrac{dy}{dx} = x + y$.

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