B.Sc DEGREE EXAMINATION,APRIL 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 an algebraic and transcendental equation.
2. Show that a root of $3x - cosx + 1$ lies between 0 and $\frac{\pi}{2}$
3. Solve the following equation by Back substitution method

   $2x + 3y + 2z = 7.$

   $-3y + z = -2.$

   $4z = 4.$
4. Prove that $E = 1 + \triangle$
5. If $f(x) = \frac{1}{x^2}$,Find the first divided differences of $[\ a, b\ ]$.
6. Write the Lagrange's interpolation formula.
7. Write the Newton-Cote's quadrature formula.
8. Define Numerical differentiation.
9. Write the Adams-Bashforth predictor formula.
10. Using Taylor's method solve $\frac{dy}{dx} = 1 + xy$ with $y_0 = 2$.Find $y(0.1)$.
11. Find the first and second order differences for $f(x) = ab^{cx}$.
12. What is Inverse Interpolation ?

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

Answer any **FIVE** questions

13. Using Bisection method,find the positive root of $x^3 - x - 1 = 0$ correct to two decimal places.
14. Solve the following system of equations using Gauss Elimination method :

    $x + y + z = 9.$

    $2x - 3y + 4z = 13.$

    $3x + 4y + 5z = 40$

15. Using Newton's divided difference formula ,find $f(8)$ from the following table

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

16. Evaluate $\int_0^6 \frac{1}{1+x}\, dx$,by using Trapezoidal rule

17. Using Picard's method ,solve $\frac{dy}{dx} = 1 + xy$ with $y(0) = 2$.Find $y(0.1), y(0.2)$.

18. Form the Forward difference table for the following data

x	0	1	2	3	4
y	8	11	9	15	6

19. Using Lagrange's formula ,find the value of y at $x = 6$ from the following data.

x	3	7	9	10
y	168	120	72	63

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

Answer any **THREE** questions

20. Using Newton-Raphson method, find the positive root of $f(x) = 2x^3 - 3x - 6 = 0$ correct to four decimal places.

21. Solve the following system of equations ,using Gauss-Seidel iteration method :

$10x + 2y + z = 9.$

$x + 10y - z = -22.$

$-2x + 3y + 10z = 22.$

22. Find $f(0, 2)$ from the following table

x	0		2	3	4	5	6
f(x)	176	185	194	203	212	220	229

23. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 51$ from the following data

x	50	60	70	80	90
y	19.96	36.65	58.81	77.21	94.61

24. Using Runge-Kutta method of the fourth order find y(0.1),given that $\frac{dy}{dx} = \frac{1}{x+y}$, $y(0) = 1$

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