B.Sc.DEGREE EXAMINATION,APRIL 2020
III Year V Semester
Numerical Methods

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

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

Answer any **TEN** questions

1. What is the order of convergence in Newton-Raphson method?
2. Define algebraic and transcendental equations.
3. What is Regula Falsi method.
4. State the conditions for convergence of Gauss-Seidal method.
5. Explain Gauss elimination method to solve $AX=B$
6. Evaluate $\triangle[x\,(x+1)\,(x+2)\,(x+3)\,]$, taking $h = 1$.
7. Define Divided differences.
8. State Lagrange's interpolation formula.
9. Write down Newton's backward difference formula to compute the derivative $\frac{dy}{dx}$.
10. State trapezoidal rule.
11. Write Picard's iteration formula.
12. Write the Runge – kutta method of fourth order to solve.
$\frac{dy}{dx}=f\,(x,y)\ \ with\ y\,(x_0)=y_0.$

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

Answer any **FIVE** questions

13. Find the Positive root of the equation $x^3-x=1$ correct to two decimals using the bisection method.
14. Solve the following set of equations by Gauss elimination method
$10x + y + z = 12, 2x + 10y + z = 13, \quad x + y + 5z = 7$
15. Estimate the missing term in the following data.

x:	0	1	2	3	4
y:	1	3	9	-	81

16. Use Newton's divided difference formula to find the value of $f(8)$ from the following data.

x:	4	5	7	10	11	13
$f(x)$:	48	100	294	900	1210	2028

17. Apply Lagrange's formula inversely to find the value of x when $f(x) = 13.5$, when $f(93.0) = 11.38$, $f(96.2) = 12.80$, $f(100) = 14.70$, $f(104.2) = 17.07$. $f(108.7) = 19.91$.

18. Find the first derivatives of $y = (x)^{1/3}$ at $x = 50$ from the table given below:

x :	50	51	52	53	54	55	56
y :	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

19. Using Taylor's method, compute y(0.2) correct to 4 decimal places given $\frac{dy}{dx} = 1 - 2xy \quad and \quad y(0) = 0$

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

Answer any **THREE** questions

20. Find the positive root of $3x - cosx - 1 = 0$ using Newton's method.

21. Solve by Gauss Seidal method $10x - 5y - 2z = 3$, $4x - 10y + 3z = -3$, $x + 6y + 10z = -3$

22. Find the value of $y(9.5)$ using Lagrange's interpolation formula.

x	7	8	9	10
y	3	1	1	9

23. A river is 80 metres wide. The depth 'd' in meters at a distance x meters from one bank is given by the following table. Calculate the area of cross section of the river using Simpson's rule.

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

24. Use Adam's method of Predictor – corrector to find $y(0.4) \quad given \quad y' = \frac{xy}{2}$, $y(0) = 1$, $y(0.1) = 1.01$, $y(0.2) = 1.022$, $y(0.3) = 1.023$