Unit III

6. (a) Find iterative formula for cube root of number N.

(b) Solve the following equations by Jacobi's iteration method :

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25.$$

7. (a) Find the real root of the equation : $x\ e^x - 3 = 0$ by Regula-Falsi method, correct to three decimal places.

(b) Solve the following equations by Gauss-Seidel equation :

$$5x + y + 2z = 19$$

$$x + 4y - 2z = -2$$

$$2x + 3y + 8z = 39.$$

Subject Code—52009

B. A. EXAMINATION

(Reappear/Main) (Batch 2018 Onwards)

(Third Semester)

MATHEMATICS

BAMH-202

Paper–B

Numerical Analysis

Time : 3 *Hours* *Maximum Marks :* 25

Note : Attempt *Five* questions in all. Q. No. **1** is compulsory. All questions carry equal marks.

1. (a) Define Average Operator.

(b) Define Simpson's 1/3rd Rule of Integration.

(c) State Gauss Backward Interpolation formula.

(d) What is order of convergence of Bisection method and Regula-Falsi method ?

(e) Write Lagrange's interpolation formula.

Unit I

2. (a) Find the lowest degree polynomial which satisfies the following values :

x	0	1	2	3	4	5
$f(x)$	0	3	8	15	24	35

(b) State and prove Newton-Gregory backward interpolation formula.

3. (a) Given :

$$f(0)=8,\ f(1)=68$$

and $f(5)=123$,

construct a divided difference table. Using the table, determine the value of $f(2)$.

(b) For the following table of values, find $f(3.5)$ using Langrange's interpolation with a quadratic interpolation polynomial :

x	1	2	3	4
$f(x)$	1	8	27	64

Unit II

4. (a) Evaluate :

$\int_0^6 \frac{1}{1+x^2}dx$ by using Trapezoidal Rule.

(b) Use Sterling's formula to find $f(35)$, given $f(20)=512$, $f(30)=439$, $f(40)=346$ and $f(50)=243$.

5. (a) Given $y_{20}=24$, $y_{24}=32$, $y_{28}=35$, $y_{32}=40$, find y_{25} by Bessel's formula.

(b) Evaluate $\int_0^1 \frac{1}{1+x^2}dx$ using Simpson's $\frac{3}{8}$th rule taking $h=\frac{1}{6}$.

Unit IV

8. (a) Given that $\frac{dy}{dx} = 2 + \sqrt{xy}$ and $y = 1$ when $x = 1$. Find approximate value of y at $x = 2$ in five steps of 0.2 each, using Euler's modified method.

(b) Use Milne-Simpson's method to obtain the solution of the equation :

$$\frac{dy}{dx} = x - y^2 \text{ at } x = 0.8$$

given that $y(0) = 0$, $y(0.2) = 0.0200$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$.

9. (a) Use Picard's method to find the third approximation of the following differential equation :

$$\frac{dy}{dx} = y - 1, \; y(0) = 2.$$

(b) Find the largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}.$$