SNS COLLEGE OF ENGINEERING - COIMBATORE-641107

DEPARTMENT OF SCIENCE AND HUMANITIES

QUESTION BANK (IAE-3)

19MA207-STATISTICS AND NUMERICAL METHODS

UNIT-IV

Part-A

1. State Lagrange's interpolation formula.
2. Give the inverse of Lagrange's interpolation formula.
3. Find the parabola of the form $y=ax^2+bx+c$ passing through the points (0,0), (1,1) & (2,20).
4. State the formula to find the first and second order derivative using the forward differences.
5. Write down the expressions for $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = x_n$ by Newton's backward difference formula.
6. Find $\frac{dy}{dx}$ at x=1 from the following table.

x:	1	2	3	4
y:	1	8	27	64

7. Evaluate $\int_{1/2}^{1} \frac{1}{x} dx$ by trapezoidal rule dividing the range into 4 equal parts.
8. Using Trapezoidal rule, evaluate $\int_0^1 \frac{dx}{1+x^2}$ with h=0.2. Hence obtain an approximate Value of π.
9. Write down the Simpson's 1/3-Rule in numerical integration.
10. What are the errors in Trapezoidal and Simpson's rules of numerical integration?

Part-B

1. Using Lagrange's interpolation formula find the value of f(3), from the following table

x:	0	1	2	5
f(x):	2	3	12	147

2. Using Lagrange's interpolation formula, find y(10) from the following table

x:	5	6	9	11
y:	12	13	14	16

3. Using Lagrange's interpolation formula, find y(10) from the following table

x:	0	1	3	4	5
y:	0	1	81	256	625

4. Use Lagrange's method to find $\log_{10}656$, given that $\log_{10}654=2.8156$, $\log_{10}658=2.8182$, $\log_{10}659=2.8189$, $\log_{10}661=2.8202$.

5. From the data given below, find the number of students whose weight is between 0-40 and 80-100.

Weight in Ibs	0-40	40-60	60-80	80-100	100-120
No. of students	250	120	100	70	50

6. Find y(22) using Newtons formula , given that

X :	20	25	30	35	40	45
Y(x):	354	332	291	260	231	204

7. Using Newton's forward interpolation formula, find the polynomial $f(x)$ satisfying the following data. Hence evaluate $f(x)$ at x (5)

x :	4	6	8	10
$f(x)$:	1	3	8	16

8. Find y (**1976**) from the following

x :	1941	1951	1961	1971	1981	1991
y :	20	24	29	36	46	51

9. Given the following data, find y'(6) and the maximum value of y.

x:	0	2	3	4	7	9
f(x)	4	26	58	112	466	922

10. For the first , second and third derivatives of f(x) at x=1.5 if

x:	1.5	2	2.5	3	3.5	4
f(x):	3.375	7	13.625	24	38.875	59

11. Compute f'(0), f''(0) ,f''(4) from the following table,

x:	0	1	2	3	4
f(x):	1	2.718	7.381	20.086	54.598

12. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by (i) Trapezoidal rule (ii) Simpson's rule. Aso check up the results by actual integration. (16)

13. By dividing the range into ten equal parts, evaluate $\int_0^\pi \sin x\, dx$ by trapezoidal & Simpson's rule. Verify your answer with actual integration. (16)

14. Evaluate $\int_0^{\pi/2} sinxdx$ by using (i) Trapezoidal rule (ii) Simpson"s rule taking 11 ordinates

UNIT-V

PART-A

1. State Taylor series algorithm for the first order differential equations.
2. Using Taylor's series find y(0.1) for $\frac{dy}{dx} = 1 - y, y(0) = 0$.
3. By using Taylor's series method, find y(1.1) for y'$= x + y, y(1) = 0$.
4. State Euler algorithm to solve $y' = f(x,y)$, $y(x_0) = y_0$.
5. State modified Euler algorithm to solve $y' = f(x,y)$, $y(x_0) = y_0$.
6. Write down the R-K formula of fourth order to solve $\frac{dy}{dx} = f(x, y)$, with $y(x_0) = y_0$
7. How many prior values are required to predict the next value in Milne's method.
8. Write down Milne's predictor-corrector formula for solving initial value problem in first order differential equation.

PART-B

1. Given $\frac{dy}{dx} = 1 + y^2$, where y=0 when x=0, find y(0.2), y(0.4) and y(0.6), using Taylor series method.
2. Using Taylor's series method find y at x=0.1 if $\frac{dy}{dx} = x^2 y - 1,\ y(0) = 1$
3. By Taylor series method, find y (0.1), y (0.2) if $\frac{dy}{dx} = x + y,\ y(0) = 1$.
4. Using Euler's method find y(0.2) and y(0.4) from $\frac{dy}{dx} = x + y,\ y(0) = 1$ with h=0.2
5. Use Euler method, with h=0.1 to find the solution of y' = x^2+y^2 with y(0)=0 in $0 \le x \le 5$
6. Using Modified Euler method, find y(0.2), y(0.1) given $\frac{dy}{dx} = x^2 + y^2,\ y(0) = 1$
7. By Modified Euler method, find y(0.1), y(0.2) and y(0.3) if $\frac{dy}{dx} = x + y,\ y(0) = 1$
8. Using R.K method of fourth order find y(0.1) and y(0.2) for the initial value problem

$\frac{dy}{dx} = x + y^2,\ y(0) = 1.$

9. If $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2},\ y(0) = 1$, find y(0.2), y(0.4) and y(0.6) by Runge - Kutta method of fourth order
10. Using R.K method of fourth order find y(0.2) and y(0.4) and y(0.6) for the initial value problem $\frac{dy}{dx} = y - x^2$, y(0) = 1
11. Given $\frac{dy}{dx} = \frac{1}{2}\left((1 + x^2)\right)y^2$ and y(0)=1 , y(0.1)=1.06, y(0.2)=1.12 , y(0.3)=1.21 evaluate y(0.4) by Milnes's predictor- cSorrector method.
12. Given and $\frac{dy}{dx} = y - x^2$ y(0)=1 , y(0.2)=1.12186, y(0.4)=1.46820 , y(0.6)=1.7379 evaluate y(0.8) by Milnes's predictor- corrector method.
13. Given $\frac{dy}{dx} = 2e^x - y$ and y(0)=2 , y(0.1)=2.010, y(0.2)=2.040 , y(0.3)=2.090 evaluate y(0.4) and y(0.5) by Milnes's predictor- corrector method.