Question Bank — NME-CE (6th Sem)

Section-A

1) Write a short note on Initial Value Problems.
2) Find the Interval in which the root of eqn. $x^3 - x - 11 = 0$ lies.
3) Write various techniques for approximating interpolating polynomials.
4) Write formula of Modified Euler's method for O.D.E.
5) Write two lines of regression by principle of Least Square.
6) Define Karl Pearson's Coefficient of Correlation.
7) Write an example of Civil Engineering related real life problem.
8) Write Normal equations for fitting of Straight line.
9) Write relation b/w Forward operator and Shift operator.
10) Write three different techniques for the Solution of Boundary Value Problem.
11) Define Interpolation & Extrapolation.
12) Evaluate $\Delta^n(e^x)$, the interval of differencing being Unity.
13) Find a Forward Difference table for the data:

x	1	2	3	4	5
y	25	88	125	250	300

14) Evaluate $\Delta^n(e^{3x+5})$.
15) What is meant by saying that Runge-Kutta formula is of the fourth order?
16) Find the root of the equation $x\sin x + \cos x = 0$
17) What are Positive & Negative Correlation?
18) Write the formula of Euler's Method.
19) What is Milne-Simpson Method?
20) What are Regression Equations?

Section-B

1) By the method of Least squares, find the Straight line that best fits the following data:

x	1	2	3	4	5
y	14	27	40	55	68

2) Using Runge-Kutta method of order 4, find $y(0.2)$ for the eqn:
$\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0)=1$, take $h=0.2$.

3) Given the following experimental Values:

x :	0	1	2	3
y :	2	4	10	15

Fit by the method of Least Square a parabola of the type $y = a+bx^2$.

4) Calculate the Coeff. of correlation & obtain the least Square regression lines for the following data:

x :	1	2	3	4	5	6	7	8	9
y :	9	8	10	12	11	13	14	16	15

5) Use Galerkin's method of least Square to find the app. sol^n of B.V.P $x\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = x$, $y(0)=0$; $y(1)=1$

6) Using Taylor's Series Method, find the Solution of $\frac{dy}{dx} = 3x+y^2$ where $y(0)=1$. Find the Value of 'y' at $x=0.01$

7) Find the Value of 'y' at $x=0.2$, Given that $\frac{dy}{dx} = x^2+y$, $y(0)=1$ in two steps of 0.1 each by using Euler's modified Method.

8) Find the Cubic polynomial which takes the values:
$y(0)=1$, $y(1)=0$, $y(2)=1$ & $y(3)=10$ Hence or otherwise obtain $y(4)$.

9) Given

x :	0	1	2	3	4
$f(x)$:	1.00	1.50	2.20	3.10	4.60

Evaluate $f(3.8)$.

10) Find the population of town in 1962. Given that

Year:	1947	1957	1967	1977	1987
Population:	15	20	27	39	52

using Gauss's Forward difference formula.

Section-C

1) Solve the equation $y'' = x+y$ with the boundary conditions $y(0) = y(1) = 0$

2) Using Runge Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with $y(0)=1$ at $x = 0.2, 0.4$.

3) Implement Lagrange's Interpolation formula & use it to compute the value of $f(5)$ from the following data for x & $f(x)$:
$(2, 46), (7, 71), (10, 110)$.

4) Solve the problem $\frac{dy}{dx} = -2y+x$, $y(0)=1$ for $y(0.1)$, $y(0.2)$ by using a) Runge Kutta of third order
b) Runge Kutta method of fourth order.

5) Fit a parabola $y = a+bx+cx^2$ to the data

x:	0	1	2	3	4
y:	1	1.8	1.3	2.5	6.3

6) Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$
Find $\sin 52^\circ$ using Newton's forward formula.

7) Using Lagrange's Interpolation formula, find $y(10)$ from the table:

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

8) Explain New-Marks Method.

9) Apply Euler's Method to solve $\frac{dy}{dx} = \frac{y-x}{y+x}$ at $x=0.1$ given that $y(0)=1$

10) Use Milne Simpson Method to the eqn. $\frac{dy}{dx} = x+y$, $y(0)=1$ & find the values of 'y' at $x=0.4$ & 0.5 $(h=0.1)$.