Roll No. Total No. of Pages : 03

Total No. of Questions : 09

B.Tech (ME) (Sem.–5th)

NUMERICAL METHODS IN ENGINEERING

Subject Code : ME-309

Paper ID : [A0818]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. **Write short notes on :**

(a) Discuss various types of errors that occur while performing numerical computations. What measures can be taken to improve the accuracy in the numerical computations?

(b) Write formulae for the Runge-Kutta method of order 4.

(c) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.

(d) Write Newton-Cote's quadrature formula.

(e) Solve the equations by matrix inversion method $x + y + 2z = 4$, $x + 2y + 3z = 1$, $2x + 3y + z = 2$.

(f) Evaluate $\left(\frac{\Delta^2}{E}\right)x^3$.

(g) Find the root of $x^4 - x - 10 = 0$ nearer to 2 of decimal.

(h) Find the cubic polynomial which takes the va $y(2) = 1$, $y(3) = 10$.

(i) Write briefly the comparison between Bisecti falsi method.

(j) Find the least square line $y = a + bx$ for the d

x	– 2	– 1	0	
y	1	2	3	

SECTION-B

2. Find the maximum value of $f(x)$ using the followir

x	– 1	1	2	
$f(x)$	– 21	15	12	

3. Find a real root of the equation $f(x) = x^3 + x^2 -$ method.

4. Find the number of terms of the exponential se gives the value of e^x correct to eight decimal pla

5. Find the largest eigen value of the matrix :

$$A = \begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$$

6. The distance in nautical miles of the visible hori in feet above the earth's surface are given as

x (height)	100	150	200	250
y (distance)	10.63	13.03	15.04	16.81

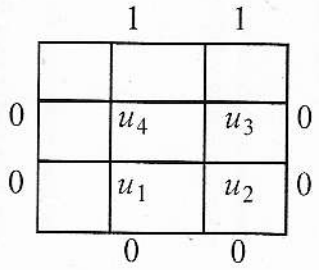
Find the value of y when $x = 410$ ft.

SECTION-C

7. Solve the initial value problem :

$\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ for $x = .1$ by Euler's method.

8. Solve the equation $u_{xx} + u_{yy} = 0$ in the domain of the following figure by Jacobi's method.



9. Find the least square polynomial of degree two for the following data :

x	0.78	1.56	2.34	3.12	3.81
y	2.50	1.20	1.12	2.25	4.28