INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
DEPARTMENT OF MATHEMATICS AND STATISTICS

MA635P-Scientific Programming Laboratory

Lab Exercise-4 (30 Marks) Deadline: 30 January 2025, 5:00 PM

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1. Create an algorithm for Lagrange's interpolation method. [2.5]

2. Create an algorithm for Hermite's interpolation method. [2.5]

3. Write a Python code for the developed algorithm for Lagrange's interpolation and ε_t and test all examples of Lecture 10 and 11. [5]

4. Based on an experiment on heated plate, temperatures are measured at various points as given in below table. Estimate the temperature at $(x, y) = (4, 3.2)$ and $(x, y) = (4.3, 2.7)$ using Lagrange's interpolating polynomial $P_4(x)$. [5]

y	$x = 0$	$x = 2$	$x = 4$	$x = 6$	$x = 8$
0	100	90	80	70	60
2	85	64.49	53.5	48.15	50
4	70	48.9	38.43	35.03	40
6	55	38.78	30.39	27.07	30
8	40	35	30	25	20

5. Write a Python code for the developed algorithm for Hermite interpolation test the example given in Lecture 12. [5]

6. Draw your hand in a piece of paper as instructions given in the class and get (x_i, y_i) at 20 locations from your graph. Use Newton's divided difference or Lagrange interpolation or Hermite interpolation to recreate the graph with as much smooth as possible accuracy. Observe the irregular hand-shape in the drawing and suggest any remedy for this. [10]