JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

M. Tech.-II Semester (CSE-Data Science)

COURSE CODE (CREDITS): 22M1WCI231 (3) MAX MARKS: 35

COURSE NAME: ADVANCED COMPUTATIONAL TECHNIQUES

COURSE INSTRUCTOR: SST MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

(c) Use of a scientific calculator is allowed.

<table>
<tr><th>Q. No.</th><th>Question</th><th>CO</th><th>Marks</th></tr>
<tr><td>Q1</td><td>Use the iterative method to find a real root of the equation $sin\ x = 10(x-1)$. Give your answer correct to three decimal places.</td><td>6</td><td>5</td></tr>
<tr><td>Q2</td><td>Solve the system of linear equations:
$6x + y + z = 20$
$x + 4y - z = 6$
$x - y + 5z = 7,$
using Jacobi method.</td><td>7</td><td>5</td></tr>
<tr><td>Q3</td><td>By using the method of moments, fit a parabola to the following data: $(1, 0.30), (2, 0.64), (3, 1.32)$, and $(4, 5.40)$.</td><td>2</td><td>5</td></tr>
<tr><td>Q4</td><td>Using the method of group averages for fitting a straight line of the form $y = a + bx$ to the following data:
<table>
<tr><td>x</td><td>0</td><td>5</td><td>10</td><td>15</td><td>20</td><td>25</td></tr>
<tr><td>y</td><td>12</td><td>15</td><td>17</td><td>22</td><td>24</td><td>30</td></tr>
</table></td><td>2</td><td>5</td></tr>
<tr><td>Q5</td><td>Values of x (in degrees) and $sin\ x$ are given in the following table:
<table>
<tr><td>x (degrees)</td><td>15</td><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td></tr>
<tr><td>$sin\ x$</td><td>0.2588190</td><td>0.3420201</td><td>0.4226183</td><td>0.5000000</td><td>0.5735764</td><td>0.6427876</td></tr>
</table>
Determine the values of $sin\ 38^o$, using Newton's backward difference formula,</td><td>8</td><td>5</td></tr>
</table>

Q6	Certain corresponding values of x and $log_{10}x$ are $(300, 2.4771)$, $(304, 2.4829)$, $(305, 2.4843)$, and $(307, 2.4871)$, find $log_{10}301$ using Lagrange's interpolation formula,	8	5
Q7	From the following table of values of x and y, obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for $x = 1.2$:	4	5

x	1.0	1.2	1.4	1.6
y	2.7183	3.3201	4.0552	4.9530