REG.NO.:

VIT

Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2024-2025

SLOT: B1+TB1

Programme Name & Branch	: B.Tech.
Course Code and Course Name	: BMAT202L -- Probability and Statistics
Faculty Name(s)	: Common Slot QP
Class Number(s)	: Common Slot QP
Date of Examination	: 17-Mar-2025
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s): Statistical Tables are Permitted

- Answer All Questions
- M - Max marks; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)

  CO2: Understand the basic concepts of random variables and find an appropriate distribution for analyzing data specific to an experiment

  CO3: Apply statistical methods like correlation, regression analysis in analyzing, Interpreting experimental data

  CO4: Make appropriate decisions using statistical inference that is the central to experimental research

<table>
<tr><th>Q. No</th><th>Question</th><th>M</th><th>CO</th><th>BL</th></tr>
<tr><td>1.</td><td>The following are data for the gasoline mileage (y) of an automobile based on its weight (x_1) and temperature (x_2) at the time of operation. Estimate y for $x_1 = 1.2$ and $x_2 = 35$.
<table>
<tr><td>Car Number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Miles per gallon (y)</td><td>17.9</td><td>16.5</td><td>16.4</td><td>16.8</td><td>18.8</td><td>15.5</td><td>17.5</td><td>16.4</td><td>15.9</td><td>18.3</td></tr>
<tr><td>Weights in tons (x_1)</td><td>1.35</td><td>1.90</td><td>1.70</td><td>1.80</td><td>1.30</td><td>2.05</td><td>1.60</td><td>1.80</td><td>1.85</td><td>1.40</td></tr>
<tr><td>Temperature (x_2)</td><td>90</td><td>30</td><td>80</td><td>40</td><td>35</td><td>45</td><td>50</td><td>60</td><td>35</td><td>30</td></tr>
</table></td><td>10</td><td>3</td><td>2</td></tr>
<tr><td>2.</td><td>(a) A machine produces identical units. The proportion of defective units produced by the machine is known to be 1/20. We also know the successive units are statistically independent. Obtain the probability that in a sample of 10 units, there are at most 2 defectives.
(b) The probability that a person recovers from a serious disease is 0.40. Find the probability that at least one of the 8 persons admitted to a hospital will survive.</td><td>10</td><td>2</td><td>2</td></tr>
<tr><td>3.</td><td>A large group of students took a test in Mathematics and the final score have a mean of 80 and a standard deviation of 15. If the scores are normally</td><td>10</td><td>2</td><td>2</td></tr>
</table>

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	distributed, when percent of the students (i) got a score below 70? (ii) passed the test given that the passing mark is 75? (iii) got a score between 90 and 100?			
4.	In a sample of 600 students of a certain college, 400 are found to use dot pens. In another college from a sample of 900 students 450 were found to use dot pens. Test with 1% LOS, whether the two colleges significantly differ with respect to the habit of using dot pens. Null and alternative hypothesis should be stated clearly.	10	4	3
5.	A bakery claims their new muffins have an average diameter of 5 centimeters (cm) with a standard deviation of 0.5 cm. You suspect the muffins might be smaller. To investigate this, you randomly sample 49 muffins and measure their diameters. The average diameter of your sample is 4.8 cm. Determine if there is enough evidence to suggest the bakery's claim (average diameter of 5 cm) is inaccurate at a 5% significance level. What about 1% level of significance?	10	4	3

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