REG. NO.:

VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: D2+TD2

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2025-2026

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	**: 18-03-2026**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s): Handwritten note book and statistical tables allowed.

- Answer All Questions
- M - Max mark; 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>An agricultural scientist wants to study how the yield of a certain crop depends on the amount of fertilizer used and the average temperature during the growing season. Data was collected for 10 different farms, and the results are given below:
<table>
<tr><td>Farm</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>Yield (Y) (in quintals/hectare)</td><td>30</td><td>35</td><td>28</td><td>40</td><td>38</td><td>45</td><td>42</td><td>50</td><td>48</td><td>52</td></tr>
<tr><td>Fertilizer (X) (in kg/hectare)</td><td>10</td><td>15</td><td>14</td><td>20</td><td>18</td><td>25</td><td>22</td><td>30</td><td>28</td><td>32</td></tr>
<tr><td>Temperature (T) (in °C)</td><td>11</td><td>13</td><td>15</td><td>18</td><td>19</td><td>20</td><td>18</td><td>24</td><td>23</td><td>21</td></tr>
</table>
Based on the above data, develop an appropriate multiple linear regression model to estimate crop yield as a function of fertilizer usage and temperature. Using this model, predict the expected crop yield (in quintals/hectare) for a farm that applies 12 kg/hectare of fertilizer and experiences an average growing season temperature of 17°C.</td><td>10</td><td>3</td><td>3</td></tr>
<tr><td>2.</td><td>(a) Two independent random variables X, Y are binomially distributed respectively with $n_1=6$, $p_1=1/4$, and $n_2=7$, $p_2=1/4$. Find the probability that $X+Y \geq 2$.
(b) A company sells bean seeds in packets of 200. Based on past tests, 5 out of every 100 seeds do not germinate. They promise that at least 90% of the seeds in each packet will germinate. What is the chance that a packet fails to meet this promise?</td><td>10</td><td>2</td><td>2</td></tr>
</table>

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3.	In a regiment of 2500 soldiers, the mean height is 170 cm and the standard deviation is 8 cm, with heights following a normal distribution. (a) Find how many soldiers are taller than 180 cm, (b) Find how many soldiers have height between 150 cm and 175 cm, (c) Find the probability that, in a randomly chosen group of 5 soldiers, 3 or more are taller than 160 cm.	10	2	2
4.	A telecom company hired an agent to campaign for their services and check the satisfaction of their customers. Before hiring the agent in the year 2020, 1115 customers of a random sample of 3580 were satisfied with the service of the company. Next year in 2021, after the campaign 1250 of a random sample of 4000 customers found to be satisfied with the services. Can we say that there is an increase in the proportion of satisfied customers from 2010 to 2011 due to the campaign at (i) 5% significance level and (ii) 1% significant level.	10	4	3
5.	To determine whether an accounting course improved performance, a test was administered to 12 participants both before and after the course. The marks obtained before the course (listed in alphabetical order of participants) were: 34, 30, 51, 42, 22, 34, 60, 31, 57, 62, 43, and 62. After completing the course, the same participants (in the same order) received the following marks: 43, 28, 59, 47, 36, 29, 63, 38, 63, 64, 50, and 68. Based on this data, can we conclude that the course was useful in improving the participants' performance?	10	4	3

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