



VIT

Vellore Institute of Technology

SLOT: G1+TG1

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

Programme Name & Branch : M.Sc. (Integrated) Bio Technology
Course Code and Course Name : TMAT 201L: Probability and Statistics
Faculty Name(s) : Dr. Jitendra Kumar/ Dr. Nalliah M/ Dr. Rajesh Moharana
Class Number(s) : VL2024250104161
Date of Examination : 19/10/2024
Exam Duration : [90 minutes] **Maximum Marks: [50]**

General instruction(s):

- Answer All Questions
- Student may use non programmable Scientific Calculator.
- Student may use standard statistical tables (like z-table, t table, chi square table etc.) and graph/ chart as per need.
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- CO3. Apply statistical methods like correlation, regression analysis in analysing, interpreting experimental data.
- CO4. Make appropriate decisions using statistical inference that is the central to experimental research.

Q. No	Question	M	CO	BL																																							
1.	Anderson et al. (Anderson 1990) provide serum cholesterol and body mass index (BMI) values for subjects who participated in a study to examine the effects of oat-bran cereal on serum cholesterol. The values of serum cholesterol and BMI for the 12 subjects included in the analysis are shown in following table: Table: Distribution of Serum Cholesterol and BMI(Body Mass Index) <table><tr><th>Subject</th><th>Serum Cholesterol(mmol/L)</th><th>BMI</th></tr><tr><td>1</td><td>7.29</td><td>29.0</td></tr><tr><td>2</td><td>8.04</td><td>26.3</td></tr><tr><td>3</td><td>8.43</td><td>21.6</td></tr><tr><td>4</td><td>7.96</td><td>21.8</td></tr><tr><td>5</td><td>5.43</td><td>27.2</td></tr><tr><td>6</td><td>5.77</td><td>24.8</td></tr><tr><td>7</td><td>6.96</td><td>25.2</td></tr><tr><td>8</td><td>6.23</td><td>24.5</td></tr><tr><td>9</td><td>6.65</td><td>25.1</td></tr><tr><td>10</td><td>6.26</td><td>23.5</td></tr><tr><td>11</td><td>8.20</td><td>27.9</td></tr><tr><td>12</td><td>6.21</td><td>24.8</td></tr></table> Plot serum cholesterol versus BMI. Calculate the correlation co-efficient between serum cholesterol and BMI. Regress serum cholesterol on BMI. Does there appear to be any linear relation between these two variables? Predict serum cholesterol if BMI is 30. Give suitable comment on your findings.	Subject	Serum Cholesterol(mmol/L)	BMI	1	7.29	29.0	2	8.04	26.3	3	8.43	21.6	4	7.96	21.8	5	5.43	27.2	6	5.77	24.8	7	6.96	25.2	8	6.23	24.5	9	6.65	25.1	10	6.26	23.5	11	8.20	27.9	12	6.21	24.8	10	3	3
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2.	If random variable X follows Poisson distribution such that $3P[X = 4] = \frac{1}{2}P[X = 2] + P[X = 0]$ Find the mean and variance of X and compute the probability $P[X \leq 2]$.	10	3	3																																							
3.	In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find (i) how many students score between 12 and 15 (ii) how many score above 18(iii) how many score below 18?	10	4	3																																							



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4.	Eight students were given a test in statistics and after one month coaching they were given another test of the similar nature. The following table gives the increase in their marks in the second test over the first. <table border="1"> <tr> <td>Student</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></tr> <tr> <td>Increase of marks</td><td>4</td><td>-2</td><td>6</td><td>-8</td><td>12</td><td>5</td><td>-7</td><td>2</td></tr> </table> Do the marks indicate that the students have gained from the coaching? You may use $t_{0.025,7} = 2.365$.	Student	1	2	3	4	5	6	7	8	Increase of marks	4	-2	6	-8	12	5	-7	2	10	4	3
Student	1	2	3	4	5	6	7	8														
Increase of marks	4	-2	6	-8	12	5	-7	2														

5.	On the basis of information's collected from a reputed hospital of New Delhi in regard to the treatment of 200 patients suffering from dengue during post south west monsoon in the month of October- November, as shown below: Table: Treatment related information's <table border="1"> <tr> <th rowspan="2">Treatment types</th><th colspan="2">Treatment effects</th><th rowspan="2">Total</th></tr> <tr> <th>Favourable</th><th>Not Favourable</th></tr> <tr> <td>New</td><td>70</td><td>20</td><td>90</td></tr> <tr> <td>Conventional</td><td>30</td><td>80</td><td>110</td></tr> </table> State whether the new treatment is comparatively superior to the conventional treatment. You may use $\chi^2_{\alpha=0.05} = 3.841$.	Treatment types	Treatment effects		Total	Favourable	Not Favourable	New	70	20	90	Conventional	30	80	110	10	4	3
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