



# PRESIDENCY UNIVERSITY

BENGALURU

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## End - Term Examinations - December 2025

Date: 23-12-2025

Time: 09:30am - 12:30pm

<b>School:</b> SOM-PG	<b>Program:</b> MBA	
<b>Course Code :</b> QNT4111	<b>Course Name:</b> Applied Business Statistics	
<b>Semester:</b> I	<b>Max Marks:</b> 100	<b>Weightage:</b> 50%

CO - Levels	C01	C02	C03	C04	C05
<b>Marks</b>	<b>16</b>	<b>19</b>	<b>34</b>	<b>31</b>	

### Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

### Part A

Answer ALL the Questions. Each question carries 3 marks.

10Q x 3M=30M

1.	A retail analytics team summarises daily sales data using a single representative value to compare store performance. Identify the advantages that make this measure suitable for such comparison.	3 Marks	L2	C01
2.	An HR manager evaluates employee salaries and notices that one commonly used measure ignores the exact magnitude of most values. List the limitations associated with this measure.	3 Marks	L2	C01
3.	A firm tracks the number of defective items found in each daily batch, where the values appear as distinct whole numbers. Identify and define the type of random variable represented in this situation.	3 Marks	L2	C02
4.	An operations manager records the time taken to complete each customer order, where the values can take any value within a range. Classify and define the type of random variable involved.	3 Marks	L2	C02
5.	A customer service centre models the number of customers who give positive feedback out of a fixed number of interactions. List the conditions that allow this count to follow a specific discrete probability model.	3 Marks	L2	C02

6.	A company tests whether a new training program improves employee productivity compared to the existing method. The analyst starts by assuming no improvement exists. Identify and define the formal assumption being made.	3 Marks	L2	CO3
7.	An HR department evaluates whether a new skill-development program leads to improved employee productivity compared to the existing routine. Recognise and define the assumption that expresses the belief that productivity levels differ after training.	3 Marks	L2	CO3
8.	A pharmaceutical company tests a new drug and concludes it works better than the existing one, even though in reality there is no improvement. Identify and define the type of statistical error committed.	3 Marks	L2	CO3
9.	A finance team analyses the relationship between advertising spending and revenue and interprets the numerical value they obtain. List the key characteristics of this numerical measure.	3 Marks	L2	CO4
10.	A production manager fits a trend line to monthly demand data to forecast future requirements. The chosen line minimises the total discrepancy between actual and predicted values. Identify the principle guiding the selection of this line and its use in simple linear regression.	3 Marks	L2	CO4

## Part B

### Answer the Questions.

**Total Marks 40M**

11.	a.	A supermarket wants to understand the typical number of customers visiting its store each day. For 12 randomly selected days, the number of customers recorded were: 58, 62, 71, 55, 49, 68, 75, 52, 64, 59, 73, 60. Based on this sample, compute and interpret a single representative value for the average customer movement, and also the central point of the distribution.	10 Marks	L3	CO1
<b>Or</b>					
12.	a.	A bank records the waiting time (in minutes) of 12 customers at a particular service counter on a busy day: 6, 9, 4, 10, 8, 7, 12, 5, 11, 13, 6, 9 The branch manager wants to analyse: (i)The value that separates the lowest quarter of waiting times from the rest. (ii)The value that isolates the top quarter of customers who waited the longest. Compute the values and interpret.	10 Marks	L3	CO1
13.	a.	An online retailer runs a short advertising campaign and contacts 10 randomly selected prospective customers. From historical data the probability that a contacted prospect makes a purchase during such a campaign is 0.30. $X =$ number of	10 Marks	L3	CO2

		purchases (conversions) in the 10 contacts is a binomial random variable. (i) Compute the probability that exactly 4 prospects convert. (ii) Compute the probability that at least 2 prospects convert. After computing each probability, state what the value implies for the campaign manager.			
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**Or**

<b>14.</b>	<b>a.</b>	A mobile service centre observes that, on average, 4 customers arrive per hour at the billing desk. The number of customers arriving in an hour follows a Poisson distribution. Let $X$ = number of customer arrivals in one hour. The manager wants to analyse the arrival pattern to decide whether an extra staff member is needed during busy hours. (i) Find the probability that exactly 2 customers arrive in the next hour. (ii) Find the probability that 4 or more customers arrive in the next hour. After each result, interpret the meaning from a managerial perspective.	<b>10 Marks</b>	<b>L33</b>	<b>CO2</b>
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<b>15.</b>	<b>a.</b>	A beverage company claims its bottles are filled to an average of 500 ml. The fill-machine historically has a population variance of 25. A quality engineer samples 36 bottles and obtains a sample mean fill 503 ml. Test at $\alpha=0.05$ whether the machine is filling to the claimed mean. (Z table value = 1.96)	<b>10 Marks</b>	<b>L3</b>	<b>CO3</b>
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**Or**

<b>16.</b>	<b>a.</b>	A retail firm runs a short sales training program for six salespeople. For each salesperson the number of weekly sales was recorded the week before and the week after training. The firm wants to test at level of significance 0.05, whether the training increased average weekly sales. (t table value is 2.015) Data (sales per week) Before: 50, 45, 60, 55, 52, 48 After: 55, 47, 65, 60, 56, 50	<b>10 Marks</b>	<b>L3</b>	<b>CO3</b>
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<b>17.</b>	<b>a.</b>	A marketing team runs an email campaign and classifies recipients into three customer segments (Segment A, B, C). For a sample of recipients, the team records whether the recipient responded (clicked/purchased) or did not respond.  <table style="margin-left: 20px;"> <tr> <td><b>Response \ Segment</b></td> <td><b>A</b></td> <td><b>B</b></td> <td><b>C</b></td> </tr> <tr> <td>Responded</td> <td>40</td> <td>50</td> <td>30</td> </tr> <tr> <td>Not responded</td> <td>60</td> <td>70</td> <td>50</td> </tr> </table> <p>Test at 0.05 level of significance if Response is independent of customer segment (Chi square table value is 5.991)</p>	<b>Response \ Segment</b>	<b>A</b>	<b>B</b>	<b>C</b>	Responded	40	50	30	Not responded	60	70	50	<b>10 Marks</b>	<b>L3</b>	<b>CO4</b>
<b>Response \ Segment</b>	<b>A</b>	<b>B</b>	<b>C</b>														
Responded	40	50	30														
Not responded	60	70	50														

**Or**

<b>18.</b>	<b>a.</b>	<p>A store manager records the number of sales calls made by six sales reps in a week and the corresponding weekly revenue (in ₹ thousands) generated by each rep:</p> <p>Data (Calls, Revenue):</p> <ol style="list-style-type: none"> <li>1. Rep A: (50, 5.0)</li> <li>2. Rep B: (40, 4.0)</li> <li>3. Rep C: (60, 6.0)</li> <li>4. Rep D: (55, 5.5)</li> <li>5. Rep E: (45, 4.5)</li> <li>6. Rep F: (65, 7.0)</li> </ol> <p>Compute the Spearman rank correlation coefficient between calls and revenue. Interpret the result.</p>	<b>10 Marks</b>	<b>L</b>	<b>CO4</b>
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**Part C**

**Answer all the Questions. Each question carries 15marks**

**2Q x 15M=30M**

<b>19.</b>	<b>a.</b>	<p>A logistics company evaluates the consistency of delivery times (in hours) for two delivery routes, Route A and Route B. The recorded delivery times for 8 randomly selected days are:</p> <p>Route A (hours): 12, 14, 11, 13, 15, 12, 14, 13</p> <p>Route B (hours): 10, 15, 13, 9, 11, 14, 12, 16</p> <p>The management wants to determine which route shows greater consistency using the coefficient of variation.</p>	<b>15 Marks</b>	<b>L4</b>	<b>CO3</b>
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<b>20.</b>	<b>a.</b>	<p>A company wants to understand whether the number of hours spent on employee training (X) affects their productivity score (Y). Data for 8 employees are collected:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Employee</th> <th>Training Hours (X)</th> <th>Productivity Score (Y)</th> </tr> </thead> <tbody> <tr><td>1</td><td>5</td><td>52</td></tr> <tr><td>2</td><td>7</td><td>55</td></tr> <tr><td>3</td><td>9</td><td>61</td></tr> <tr><td>4</td><td>10</td><td>63</td></tr> <tr><td>5</td><td>12</td><td>67</td></tr> <tr><td>6</td><td>14</td><td>70</td></tr> <tr><td>7</td><td>15</td><td>72</td></tr> <tr><td>8</td><td>17</td><td>76</td></tr> </tbody> </table> <p>(a) Compute the regression equation of Y on X. (b) Estimate productivity when training hours = 11.</p>	Employee	Training Hours (X)	Productivity Score (Y)	1	5	52	2	7	55	3	9	61	4	10	63	5	12	67	6	14	70	7	15	72	8	17	76	<b>15 Marks</b>	<b>L4</b>	<b>CO4</b>
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