23PCMB514

MANGALORE INSTITUTE OF TECHNOLOGY & ENGINEERING

(A Unit of Rajalaxmi Education Trust®, Mangalore)
Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE, New Delhi
Accredited by NAAC with A+ Grade & ISO 9001:2015 Certified Institution

Model Question Paper

First Semester MBA Degree Examination, 2023-24

Business Statistics and Analytics

Time: 3 Hours **Max. Marks: 100**

Note: 1. Answer any FOUR full questions from Q1 to Q7.
2. Question No. 8 is compulsory.
3. M: Marks, L: RBT (Revised Bloom's Taxonomy) level, C: Course outcomes.
4. Use of statistical tables is permitted.

<table>
<tr><th colspan="3"></th><th>M</th><th>L</th><th>C</th></tr>
<tr><td rowspan="3">Q1</td><td>a.</td><td>What are the essential components of business analytics?</td><td>03</td><td>L2</td><td>CO1</td></tr>
<tr><td>b.</td><td>How can analysts actively contribute to team success and organizational objectives by applying their essential skills?</td><td>07</td><td>L2</td><td>CO1</td></tr>
<tr><td>c.</td><td>An e-commerce company wants to optimize its marketing campaigns to increase sales during the holiday season - How can businesses effectively leverage different levels within the field of business analytics to enhance decision-making and optimize performance?</td><td>10</td><td>L3</td><td>CO2</td></tr>
<tr><td rowspan="3">Q2</td><td>a.</td><td>Calculate range and its co-efficient for the data given below.
<table>
<tr><td>Marks</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td></tr>
<tr><td>No of students</td><td>8</td><td>10</td><td>12</td><td>8</td><td>4</td></tr>
</table></td><td>03</td><td>L3</td><td>CO2</td></tr>
<tr><td>b.</td><td>The following details representing the monthly data usage (in gigabytes) of a group of users:
<table>
<tr><th>Data Usage Range (GB)</th><th>Frequency</th></tr>
<tr><td>10 -20</td><td>8</td></tr>
<tr><td>20-30</td><td>15</td></tr>
<tr><td>30-40</td><td>20</td></tr>
<tr><td>40-50</td><td>12</td></tr>
<tr><td>50-60</td><td>5</td></tr>
</table>
Imagine a telecommunications company is analyzing data usage patterns to optimize their service plans. Calculate the mean, median, and mode of the continuous data usage distribution. Provide insights into the central tendencies and identify the most common data usage range to assist the company in tailoring their plans to meet customer needs more effectively.</td><td>07</td><td>L3</td><td>CO2</td></tr>
<tr><td>c.</td><td>The following data representing the monthly returns (in percentage) on two different investment portfolios:
<table>
<tr><th>Return Range (%)</th><th>Frequency 1</th><th>Frequency 2</th></tr>
<tr><td>-5 – 0</td><td>10</td><td>5</td></tr>
<tr><td>0 - 5</td><td>15</td><td>20</td></tr>
</table></td><td>10</td><td>L4</td><td>CO3</td></tr>
</table>

		5 – 10 | 8 | 10 10 – 15 | 5 | 8 15 - 20 | 2 | 7 As a financial analyst, compare and contrast the risk and variability between the two investments portfolios based on these measures. Discuss how the standard deviation and coefficient of variation provide insights into the relative volatility and risk-adjusted performance of the two portfolios with continuous distribution.			
Q3	a.	Consider a scenario where you are tracking the speed of a vehicle during a road trip. The vehicle's speed is 60 km/h for the first half of the journey and 40 km/h for the second half. Calculate the mean of the speeds to determine the overall average speed for the entire trip.	03	L3	CO2
	b.	Calculate first quartile, 7th deciles and 60th percentile for the following data **Wages (Rs)** | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 **No of persons** | 1 | 3 | 11 | 21 | 43 | 32 | 9	07	L3	CO2
	c.	Calculate Spearman's rank correlation coefficient for the below dataset. As an analyst, interpret the correlation coefficient in the context of the relationship between variables X and Y. Observation | X | Y 1 | 20 | 15 2 | 25 | 20 3 | 15 | 12 4 | 20 | 18 5 | 30 | 25 6 | 18 | 10 7 | 28 | 22 8 | 22 | 18 9 | 25 | 20 10 | 12 | 30	10	L3	CO2
Q4	a.	what are mutual inclusive and mutual exclusive event?	03	L2	CO1
	b.	The probability that a watch manufactured by a company will be defective is 1/10. If 12 such watches are manufactured, solve the probability that i) Exactly two watches will be defective ii) At least two watches will be defective iii) None will be defective	07	L3	CO2
	c.	The following are the number of words per minute which a secretary typed on several occasions on the three different typewriters. Typewriters 1 | 71 | 78 | 70 | 69 | 77 | 72 | 65 | 69 Typewriters 2 | 74 | 76 | 72 | 70 | 69 | 68 | 72 | 73 Typewriters 3 | 70 | 72 | 66 | 64 | 63 | 67 | 69 | 70 Test whether the difference among the mean of the three samples can be attributed to chance. You may use 5% level of significance.	10	L5	CO4
Q5	a.	How can time series analysis find practical applications across different domains and industries?	03	L2	CO1

	b.	Below are given the figures of production of a sugar factory. Year: 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 Production: 80 | 90 | 92 | 83 | 94 | 99 | 92 Fit a straight line trend and show the trend line on graph. Estimate production in 2020. (Least square method)	07	L3	CO2
	c.	Analyse the method of monthly averages to determine the monthly indexes for the data of production of a commodity for the year 2021 to 2023. Month | 2021 | 2022 | 2023 Jan | 15 | 23 | 25 Feb | 16 | 22 | 25 Mar | 18 | 28 | 35 Apr | 18 | 27 | 36 May | 23 | 31 | 36 Jun | 23 | 28 | 30 Jul | 20 | 22 | 30 Aug | 28 | 28 | 34 Sep | 29 | 32 | 38 Oct | 33 | 37 | 47 Nov | 33 | 34 | 41 Dec | 38 | 44 | 53	10	L4	CO3
Q6	a.	State the type I and Type II error with the help of an example.	03	L2	CO1
	b.	If 5% of the electric bulbs manufactured b a company are defective, use Poisson distribution to solve the probability that in a sample of 100 bulbs i) None is defective ii) 5 bulbs will be defective (given : $e^{-5} = 0.007$)	07	L3	CO2
	c.	The HRD manager wishes to see if there has been any change in the aptitude of training after a specific training program. Scores are given below. Find: has any change takes place at 5% level of significance level. (t @ 5% level is 1.860) Trainee | A | B | C | D | E | F | G | H | I Scores before training | 75 | 70 | 46 | 68 | 68 | 43 | 55 | 68 | 77 Scores after training | 70 | 77 | 57 | 60 | 79 | 64 | 55 | 77 | 76	10	L5	CO4
Q7	a.	Differentiate between Parametric and Non Parametric Test.	03	L2	CO1
	b.	Define Hypotheses. Explain in detail the steps used to test the hypotheses	07	L2	CO1
	c.	In a survey of 200 boys it was found that 75 were intelligent, 40 had educated fathers, while 85 of the unintelligent boys had uneducated fathers. Do these figures support the hypothesis that educated fathers have intelligent boys ($X^2_1 = 3.84$)? Evaluate.	10	L5	CO4
Q8	a.	**CASE STUDY (Compulsory)** In a manufacturing organization with 5000 employees, the mean wage of workers is Rs 8000 per month with standard deviation of Rs 2000. Assuming normal distribution, estimate: i) Number of workers getting salary below Rs 6000 ii) Number of workers getting salary above Rs 10000 iii) Number of workers getting salary between Rs 7000 and Rs 9000	10	L3	CO2

	b.	Given $P(0<z<1) = 0.34134$ and $P(0<z<0.5) = 0.1915$ Consider a dataset representing the monthly advertising spending (in thousands of dollars) and the corresponding monthly sales (in thousands of units) for a company: **Advertising Spending (Rs in 000)** / **Sales (Rs 000)** 5 / 50 8 / 60 10 / 65 15 / 80 20 / 95 Calculate Karl Pearson's correlation coefficient for this dataset. As a business analyst, interpret the correlation coefficient in the context of the relationship between advertising spending and sales. Discuss the strength and direction of the linear association and what implications this might have for the company's marketing strategy.	10	L4	CO3

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