# St. Claret College

## Autonomous, Bengaluru

ROLL NO:

DATE:

**PG END SEMESTER EXAMINATION-MAY 2025**

**MBA FIRST SEMESTER**

**MBA 1424: STATISTICS FOR MANAGEMENT**

**TIME: 3 hours.** 4 **MAX. MARKS: 70**

**This paper contains FOUR printed pages and FOUR parts**

**Instructions:**
1. **Verify and ensure that the question paper is completely printed.**
2. **Any discrepancies or questions about the exam paper must be reported to the COE within 1 hour after the examination.**
3. **Students must check the course title and course code before answering the questions.**

## PART-A

**Answer SIX questions out of EIGHT. Each answer carries TWO marks.** **[2x6 = 12]**

1. A sports club has 60 jerseys in a raffle, each marked with a distinct number from 1 to 60. If a winner is drawn randomly, what is the chance that their jersey number is a multiple of 6 or 8?

2. You're a junior analyst at a crypto trading firm tracking Luna Coin prices. Here are the closing prices (USD) over the past 2 days:

| **Day** | 1 | 2 |
|---|---|---|
| **Price ($)** | 142.50 | 145.75 |

Using simple exponential smoothing ($\alpha = 0.6$): Forecast the Day 3 closing price.

3. Elaborate on skewness and kurtosis in statistical analysis.

4. Explain the key characteristics that distinguish parametric from non-parametric tests in statistical analysis.

5. How does increasing the confidence level from 95% to 99% affect the significance level?

6. Explain the concept of a statistical hypothesis and discuss the implications of Type I and Type II errors in decision-making.

7. Explain the concept of Expected Monetary Value (EMV) in Decision Theory.

8. Distinguish between variance and coefficient of variance.

## PART-B

**Answer any THREE questions out of FIVE. Each answer carries EIGHT marks.** **[8x3=24]**

9. A transportation company is evaluating two fuel suppliers based on the daily price fluctuations of gasoline (in dollars per gallon) over ten days. If the company prioritizes stability in fuel prices, use the coefficient of variation to determine which supplier offers more consistent prices.

| Day | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 | Day 8 | Day 9 | Day 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Green Fuel Ltd.** | 3.30 | 3.55 | 3.70 | 3.80 | 3.20 | 3.40 | 3.65 | 3.75 | 3.25 | 3.50 |
| **Eco Petro Corp.** | 3.50 | 3.55 | 3.60 | 3.65 | 3.45 | 3.52 | 3.58 | 3.62 | 3.48 | 3.54 |

Advise the company on which fuel supplier they should choose for price stability.

10. A fitness research center conducted a study to analyze how the time spent on exercise (in minutes) affects the calories burned in a session. The data collected from different individuals is presented below:

| Person | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| **Exercise Time (minutes)** | 30 | 45 | 60 | 20 | 50 | 40 | 35 | 55 | 65 |
| **Calories Burned** | 200 | 300 | 400 | 150 | 350 | 280 | 240 | 370 | 450 |

a. Calculate the regression lines and estimate the calories burned if a person exercises for 75 minutes.
b. Estimate the exercise duration required to burn 500 calories.
c. Find the Correlation between exercise timing and calories burned.

11. A city government is studying the safety impact of electric vehicles (EVs) compared to conventional fuel-powered cars. The number of accidents involving each type of vehicle was recorded over a year:

| Accident Outcome | Involved in an Accident | No Accident |
|---|---|---|
| **Electric Vehicle** | 95 | 905 |
| **Fuel-Powered Vehicle** | 150 | 850 |

Using the Chi-Square Test at a 5% significance level, analyze whether vehicle type has a significant effect on the likelihood of being involved in an accident.

12. Explain the three types of decision-making environments with appropriate descriptions. Additionally, describe a Decision Tree, outline the steps involved in its construction, and analyze its importance in managerial decision-making.

13. A bakery chain sources its flour from three different suppliers: Supplier A, Supplier B, and Supplier C. Supplier A provides 30% of the flour, Supplier B supplies 40%, and Supplier C supplies 30%. Due to contamination issues, 2% of the flour from Supplier A is contaminated, 1.2% from Supplier B, and 3% from Supplier C. A random sample of flour is tested and found to be infected. What is the probability that this contaminated flour came from Supplier B or Supplier C?

## PART-C

**Answer any TWO questions out of THREE. Each answer carries TEN marks.** **[10X2=20]**

14. A market research firm is conducting a survey to understand consumer preferences for electric vehicles (EVs) in a metropolitan city. The city has a population of 5 million, and the firm needs to select a representative sample of 5,000 respondents.

a. Identify the most appropriate sampling technique for this study and justify your choice.
b. If the research firm decides to use Stratified Sampling, explain how they should divide the population into strata and select participants.
c. Suppose the firm opts for Cluster Sampling instead. How would the sampling process differ from Stratified Sampling in this scenario?
d. Explain one real-world advantage and one limitation of Systematic Sampling in large-scale market research.

15. An education research institute tested five different teaching methods to analyze their impact on students' academic performance across four schools. The students' average test scores (out of 100) were recorded for each method in different schools. Use the ANOVA technique at a 5% significance level to determine whether there is a significant difference in student performance across the teaching methods. Determine if different teaching methods lead to significantly different student performance.

| School | Method A | Method B | Method C | Method D | Method E |
|---|---|---|---|---|---|
| **School X** | 78 | 85 | 80 | 88 | 82 |
| **School Y** | 74 | 90 | 86 | 85 | 89 |
| **School Z** | 82 | 87 | 79 | 81 | 76 |
| **School W** | 85 | 92 | 84 | 89 | 91 |

16. Mr. Arjun, an investor, has two promising opportunities but can pursue only one at a time.

**Option 1**: Solar Energy Business: He can start a solar power plant with an investment of ₹50 lakhs. The probability of success is 70%, with an expected cash inflow of ₹65 lakhs. If the business fails, he can still recover ₹30 lakhs. If the solar business succeeds, he can expand into solar-powered electric vehicle charging stations with an additional investment of ₹35 lakhs. The probability of success for this expansion is 65%, with an expected cash inflow of ₹42 lakhs. If the expansion fails, he incurs a loss of ₹6 lakhs.

**Option 2:** Real Estate Development: Alternatively, he can invest ₹50 lakhs in a commercial real estate project. The probability of success is 75%, with an expected cash inflow of ₹60 lakhs. If the venture fails, he can still recover ₹35 lakhs. If the real estate project succeeds, he can choose to invest in a luxury apartment complex, which requires an additional investment of ₹40 lakhs. The probability of success for this expansion is 55%, with an expected cash inflow of ₹50 lakhs. If this expansion fails, he can recover ₹10 lakhs.

a. Draw a decision tree showing the possible outcomes of both investment options.
b. Advise Mr. Arjun on the better investment choice, considering risks and returns. Should Arjun invest in renewable energy for a sustainable future or choose real estate for stable returns? Analyze and justify your recommendation.

## PART-D

**Answer the following.** **[14X1=14]**

17. The Agricultural Research Institute of Punjab experimented to improve the yield of wheat crops in different climatic conditions. The institute has collected data on the heights and grain weights of 5000 wheat plants to analyze the effectiveness of new farming techniques. The data follows a Normal Distribution with the following characteristics:

- Average height of wheat plants: 90 cm, with a standard deviation of 10 cm.
- Average grain weight per plant: 250 grams, with a standard deviation of 50 grams.

Using this data, answer the following questions:

a. How many wheat plants are taller than 110 cm?
b. How many wheat plants have heights between 80 cm and 105 cm?
c. What Percentage of wheat plants are shorter than 65 cm?
d. How many wheat plants have grain weights greater than 320 grams?
e. How many wheat plants have grain weights less than 200 grams?
f. What percentage of wheat plants have grain weights between 220 grams and 300 grams?

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