CLASS:     MBA                                                                  SEMESTER: IV
BRANCH:    MBA                                                                  SESSION: SP/2024

**SUBJECT: MT550 MULTIVARIATE DATA ANALYSIS**

TIME:      3 Hours                                                             FULL MARKS: 50

**INSTRUCTIONS:**
1. The paper contains five questions, each of 10 marks and 50 marks.
2. Attempt all questions. Notations, if any, are of usual meaning.
3. The missing data, if any, may be assumed suitably.
4. ensure you have the correct question paper before attempting the question paper.
5. Tables/Data handbook/Graph paper to be supplied to candidates in the examination hall.

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| Q.1(a) | Define Regression as a suitable Predictive Model. | [5] |
| Q.1(b) | Take any business problem and show the efficacy of using the Regression model in prediction with Inference. | [5] |

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| Q.2(a) | A man buys 100 electric bulbs of 'Bajaj' and 100 'Philips' bulbs. He finds that 'Bajaj' gave an average life of 1500 hours with a standard deviation of 60 hours, and 'Philips' bulbs gave an average life of 1600 hours with a standard deviation of 80 hours.<br>Is there a significant difference in the mean life of the two brands?<br>(Given the critical value (Z) is +/- 1.96 at 5% level of significance) | [5] |
| Q.2(b) | Explain a business situation where Factor Analysis is the best-suited approach. | [5] |

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| Q.3 | Discuss (any TWO) the suitability of using the following methods for Multivariate Analysis ( preferably with business application):<br>    a.  Multidimensional Scaling<br>    b.  Confirmatory Factor Analysis<br>    c.   Principal Component Analysis | [5+5=10] |

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| Q.4(a) | Mr Verma, business manager of LG Electronics Ltd., wants to test the lifetime of three Washing machines of each of the four Brands. Data is shown below, each representing the average lifetime of a washing machine, measured in thousands of hours. | [5] |

| A | B | C | D |
|---|---|---|---|
| 20 | 25 | 24 | 23 |
| 19 | 23 | 20 | 20 |
| 21 | 21 | 22 | 20 |

As a business manager of consumer research, Mr Verma wants to test and compare the lifetime of four Washing machine brands.
Use suitable statistical tests to check whether the average lifetime of different Washing machine brands is equal or not.
(Given the tabulated value of F at (3, 8) degrees of freedom is 4.07, and the Level of Significance (LOS) is 5%. )

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| Q.4(b) | Define MANOVA, stating its assumptions with a real-life application. | [5] |

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| Q.5(a) | Discuss the suitability of Structural Equation Modelling (SEM) in Multivariate Analysis. | [5] |
| Q.5(b) | How does SEM differ from prototype Multivariate Normal? Explore the differences with a suitable example. | [5] |

**Alignment of CO and Bloom's Taxonomy (Hierarchical ordering of Cognitive skills)**

| Question No. | Alignment of CO and Bloom's Taxonomy |
|---|---|
| 1 | Develop a basic Understanding of concepts of Regression as Multivariate Analysis     [CO: (1) Knowledge; Module No. 1] |
| 2 | Given the problem, comprehend a suitable hypothesis test to make the optimal decision. [ CO: (2) Comprehension; Module No. 2] |
| 3 | Explain the Multivariate techniques we use in a specific problem.<br><br>[CO: (3) Explanation; Module No. 3] |
| 4 | Evaluation and Application of the Mechanism of Multivariate Normal.<br><br>[CO: (4) Analysis; Module No.4 ] |
| 5 | Analyse SEM as an advanced method of Multivariate Analyses and their application to Engineering and Management Science.<br><br> [CO: (5) Synthesis / Evaluation; Module No.5 ] |