

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)**

**CLASS: MBA  
BRANCH: MANAGEMENT**

**SEMESTER: III  
SESSION: MO/2025**

**SUBJECT: MT550 MULTIVARIATE DATA ANALYSIS**

**TIME: 3 Hours**

**FULL MARKS: 50**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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|--|-----|----|----|
| Q.1(a) Discuss the concept of Multicollinearity. How will you identify and rectify multicollinearity?  | [5] | 1  | 2  |
| Q.1(b) Briefly Explain the concepts and measurement tools for:<br>a) Heteroscedasticity b) Serial Correlation  | [5] | 1  | 2  |
| Q.2(a) Discuss the meaning and applications of the following techniques in business decision making and/or research:<br>a) Multidimensional Scaling<br>b) Confirmatory Factory Analysis  | [5] | 2  | 2  |
| Q.2(b) (i) How will you apply Exploratory Factor Analysis to solve real-life business problems.<br>(ii) Comment on the following results of an Exploratory Factor Analysis:<br>KMO = 0.55; Barlett's Test of Sphericity: 0.000 (p value); Cronbach's Alpha: Factor 1 = .640, Factor 2 = .711, Factor 3 = .655, Factor 4 = .790.<br>Total Variance Explained = 69%. | [5] | 2  | 4  |
| Q.3(a) Write notes on the following:<br>a) MANOVA - Multivariate Analysis of Variance<br>b) Structural Equation Modeling   | [5] | 3  | 2  |
| Q.3(b) Following are the results of Post-Hoc tests applied after ANOVA. You are required to:<br>a) Formulate the Null and Alternate Hypotheses<br>b) Interpret the Results of Post-Hoc Test (Multiple Comparisons) to find the results of formulated Hypotheses.   | [5] | 3  | 3  |

Multiple Comparisons				
Dependent Variable: Job Satisfaction (Tukey HSD)				
(I) Managerial Level	(J) Managerial Level	Mean Difference (I-J)	Std. Error	Sig.
Low	Medium	-1.653*	.436	.001
	High	-1.624*	.389	.000
Medium	Low	1.653*	.436	.001
	High	.029	.403	.997
High	Low	1.624*	.389	.000
	Medium	-.029	.403	.997

\*. The mean difference is significant at the 0.05 level.

**Additional Information:**

Independent Variable = Managerial Level (03 categories: Low, Medium, High)  
Dependent Variable = Job Satisfaction (Metric Variable, Measured on 5 Point Scale)

- Q.4(a) In a university, a student has 68 marks in an 'Aptitude Test', His average percentage of marks in Graduation and Postgraduation is 65 and 82 respectively, His 'Overall Personality Score' is 8. Based on the following information of a discriminant model, predict whether the student will get a placement or not: [5] 4 4
- Functions at group centroids = -3.564 (Not Placed); +4.201 (Placed)
  - Constant: 4.228
  - Coefficients: Aptitude Test = 0.012, Graduation Marks (%) = 0.007, Post Graduation Marks (%) = 0.013, Overall Personality Score = 0.452.
- Q.4(b) Discuss the applications of Binary Logit Model of Qualitative Choice in Business Decision Making. Use suitable examples to support your answer. [5] 4
- Q.5(a) Discuss the applications for Functional Data Analysis in Business Decision Making with the help of suitable examples across industries /sectors. [5] 5
- Q.5(b) Explain with the help of suitable figures the concept of Functional PCA (Principal Component Analysis). [5] 5

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