

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

CLASS: MBA
BRANCH: MBA

SEMESTER : IV
SESSION : SP/2025

SUBJECT: MT532 DECISION SCIENCE FOR BUSINESS MODELLING

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) Describe the different (i)types of data and (ii)data collection methods | [5] | 1 3 |
| Q.1(b) Elaborate your understanding on the Measures of (i) Central Tendencies (ii) Measures of dispersion | [5] | 1 4 |

- Q.2 Describe the Assumptions of Multiple Regression. [10] 2 5
For the following data set estimate the, Beta vector and develop the Multiple regression model. Also estimate the SSE for the regression model.

Advertising Spend	Number of Sales Representatives	Sales (Rsx1000)
10	3	25
12	4	30
13	2	28
15	5	35
17	4	38

- Q.3 For a Binomial distribution of parameters n (no of trials) θ (probability of success) prove that, [10] 3 5
- (i) Mean (μ) = $n \theta$
 - (ii) Variance (σ^2) = $n \theta(1 - \theta)$

- Q.4 A researcher is studying the effect of three different diets (Diet A, Diet B, and Diet C) on two health outcomes: weight loss (in kg) and reduction in cholesterol level (in mg/dL) after 6 weeks. The data collected from a random sample of individuals for each diet group is as follows: [10] 4 5

Diet Group	Weight Loss (kg)	Cholesterol Reduction (mg/dL)
A	3.2	15
A	2.8	18
A	3.5	17
B	4.0	25
B	3.8	23
B	4.2	26
C	2.0	10
C	2.3	11
C	1.9	9

- (i) State the null and alternative hypotheses for the MANOVA test.
 - (ii) Perform a MANOVA test to determine if there are significant differences in both dependent variables (weight loss and cholesterol reduction) across the three diet groups.
 - (iii) Interpret the result using a significance level of $\alpha = 0.05$.
- Note: It is given that, $\chi^2(0.05, 4) = 9.49$

- Q.5 Elaborate your understanding and their business application of,
- (i) Factor Analysis
 - (ii) Structural Equation Modelling

[10] 4 3

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