

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

CLASS: BBA/IMBA
BRANCH: BBA/IMBA

SEMESTER : III/ADD
SESSION : MO/2025

SUBJECT: MN206 QUANTITATIVE TECHNIQUES IN MANAGEMENT

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 handbook/Graph paper etc. to be supplied to the candidates in the examination hall.
- Z table , and X^2 (Chi-square) Tables to be supplied.**

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|---|-----|----|----|
| Q.1(a) State and explain the Addition Law and Multiplication Law of Probability. | [5] | 1 | 2 |
| Q.1(b) In a class of 40 students: | [5] | 1 | 3 |
| <ul style="list-style-type: none"> 18 students like Mathematics 16 students like Science 10 students like both Mathematics and Science | | | |
| Using a Venn Diagram, find: | | | |
| (i) The number of students who like either Mathematics or Science or both. | | | |
| (ii) The number of students who like only one subject | | | |
| (iii) The number of students who like neither subject | | | |
| Q.2(a) Explain the difference between Quota Sampling and Cluster Sampling with suitable examples. | [5] | 2 | 2 |
| Q.2(b) A population has a mean of 80 and a standard deviation (σ) of 10. A random sample of 25 observations is taken from this population. Calculate the Standard Error of the Mean (S.E.) and explain its significance in sampling distribution. | [5] | 2 | 3 |
| Q.3(a) Explain the concept of a confidence interval for a population mean and a population proportion. Discuss the factors that affect the width of a confidence interval and its importance in decision-making. | [5] | 3 | 2 |
| Q.3(b) In a survey of 500 consumers, 120 stated that they prefer brand X over other brands. Estimate a 95% confidence interval for the true population proportion of consumers who prefer brand X. | [5] | 3 | 3 |
| Q.4(a) Differentiate between Type I and Type II error with suitable example. | [5] | 4 | 2 |
| Q.4(b) A university claims that 70% of its students are satisfied with the online learning system. In a random sample of 120 students, 78 reported being satisfied. Test the university's claim at a 5% level of significance. | [5] | 4 | 4 |
| Q.5(a) Explain the important properties of the Chi-Square (χ^2) distribution. | [5] | 5 | 2 |
| Q.5(b) A school cafeteria manager wants to determine whether student grade level (Grade 9 / Grade 10 / Grade 11) is related to their choice of lunch menu (Veg / Non-Veg / Vegan). The following data shows the number of students observed in each category: | [5] | 5 | 4 |

Grade Level	Veg	Non-Veg	Vegan
Grade 9	15	25	10
Grade 10	20	30	15
Grade 11	10	20	5

Using the Chi-Square test, examine whether student grade level and lunch menu choice are independent.