**Quantitative Methods – I**

**Dec 2024 Examination**

**Q1. Explain the following concepts:**

* **Difference between point estimate and interval estimate. (2 Marks)**
* **Concept of confidence interval for any estimate (Mean / Proportion). (2 Marks)**

**And solve the following question**

**A sample of 30 students’ test scores is randomly selected from a large class. The sample has a mean score of 85 points and a standard deviation of 6 points. Calculate the 99% and 95% confidence intervals for the population mean. (6 Marks)**

**(10 Marks)**

**Ans 1.**

**Introduction**

Estimation is a fundamental aspect of statistics used to draw inferences about population parameters based on sample data. In any study or research where it is impractical to gather information from every member of a population, estimation provides a practical alternative by allowing us to make educated guesses about the population based on a sample. There are two primary types of estimates: point estimates and interval estimates. A point estimate provides a single value as an estimate of a population parameter, while an interval estimate provides a range within which the parameter is expected to fall, offering a degree of confidence in the estimate. The concept of confidence intervals, which is part of interval estimation, allows

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**Q2 (A) The monthly rent paid by a group of 15,000 tenants in a city is found to be normally distributed with a mean of ₹12,000 and a standard deviation of ₹1,500. Answer the following questions:**

**a) What is the probability that a tenant selected at random pays more than ₹10,500 in rent?
b) What is the probability that a tenant selected at random pays more than ₹14,700 in rent?
(5 Marks)**

**Ans 2A.**

**Introduction**

Probability distributions are essential in understanding data patterns, especially in large datasets like monthly rents for tenants. In this case, rent data for 15,000 tenants follows a normal distribution, with a mean of ₹12,000 and a standard deviation of ₹1,500. Understanding how likely a particular rent is can provide insights into expected costs for tenants and property managers. Here, we calculate the probabilities of rents being above certain values using concepts from the normal distribution and Z-scores.

**Concept and Application**

A normal distribution, often called a bell curve, is a continuous probability distribution

**Q2 (B) A pharmaceutical company claims that its new drug reduces the average recovery time from the flu to less than 7 days. Historically, the average recovery time for the flu without the drug is 7 days. To test this claim, the company conducted a study with 50 patients who took the new drug. The sample mean recovery time was 6.5 days with a population standard deviation of 2 days. Can we accept the company's claim at the 5% level of significance? (5 Marks)**

**Ans 2B.**

**Introduction**

In hypothesis testing, pharmaceutical companies often use statistical methods to validate claims about new drugs. Here, a company claims that its new drug reduces the average recovery time from the flu to less than 7 days, a significant improvement from the historical average of 7 days. To test this claim, a sample of 50 patients was studied, revealing an average recovery time of 6.5 days. We will use a one-sample Z-test at a 5% significance level to determine if the