**Quantitative Methods - I**

**Jun 2025 Examination**

**PLEASE NOTE: This assignment is application based, you have to apply what you have learnt in this subject into real life scenario. You will find most of the information through internet search and the remaining from your common sense. None of the answers appear directly in the textbook chapters but are based on the content in the chapter**

**Q1. From a large batch of batteries, a sample of size 50 is drawn. The average lifespan of the batteries is 1200 hours with a standard deviation of 200 hours.**

**1. Find the probability that the mean lifespan of the sample is less than 1150 hours. (3 Marks)**

**2. Calculate the 95% confidence interval for the sample mean lifespan. (4 Marks)**

**3. Discuss the effect of increasing the sample size to 100 on the standard error and the probability calculation. (3 Marks)**

**(10 Marks)**

**Ans 1.**

**Introduction**

Statistical methods play a crucial role in understanding and predicting real-world scenarios, such as estimating the lifespan of batteries. In this problem, we analyze the lifespan of a sample of batteries drawn from a large batch using probability and confidence interval concepts. The given data includes an average lifespan of 1200 hours with a standard deviation of 200 hours for a sample size of 50. The objective is to determine the probability that the sample mean lifespan is below 1150 hours and calculate the 95% confidence interval for the sample mean. Additionally, we discuss how increasing the sample size to 100 affects the standard error and probability calculations. These statistical concepts help industries make informed decisions

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**Q2A. A deck of cards contains 10 red and 6 black cards. If two cards are randomly drawn without replacement, what is the probability that both cards drawn are black?**

**What is the probability that at least one of the two cards drawn is red? Total 5 Marks**

**Ans 2A.**

**Introduction**

Probability plays an essential role in determining the likelihood of events in random experiments. In this case, we analyze the probability of drawing two black cards from a deck containing 10 red and 6 black cards when drawn without replacement. This concept is particularly useful in scenarios involving dependent events, where the outcome of the first event affects the probability of the second event. Additionally, we determine the probability of drawing at least one red card, which helps in understanding complementary probability events.

**Concept and Application**

In probability theory, when drawing cards without replacement, the probability of drawing a

**Q2B. A milling machine is set to produce rods that have an average length of 15.00 cm. The machine is known to have a standard deviation () of 0.3 cm. The customer specifies the rod length to be within 14.80 cm and 15.20 cm. What is the acceptance percentage given the setting and age of the machine (age determines the standard deviation)? (5 Marks)**

**Ans 2B.**

**Introduction**

Quality control in manufacturing relies on statistical analysis to ensure products meet specified standards. In this case, a milling machine is set to produce rods with an average length of 15.00 cm and a standard deviation of 0.3 cm. The customer requires rod lengths to be within the range of 14.80 cm to 15.20 cm. We determine the acceptance percentage by calculating the probability that a randomly produced rod falls within this specified range using statistical