



THE ANSWERS MUST BE ATTEMPTED ON THE ANSWER SHEET PROVIDED

Q.1. Answer the following short questions. (6x5=30)

- i. Write down six steps of testing procedure of the hypothesis $H_0: \mu = \mu_0$.
- ii. Explain the difference between parameter and statistic.
- iii. What is bias and how it can be reduced?
- iv. Distinguish between Simple hypothesis and Composite hypothesis.
- v. Distinguish between Type I-Error and Type II- Error.
- vi. Explain the central limit theorem.

Answer the following questions. (3x10=30)

Q.2 (a) The length of life for a washing machine is approximately normally distributed, with a mean of 3.5 years and a standard deviation of 1.0 years. If this type of washing machine is guaranteed for 12 months, what percentage of the sales will require replacement?

Q.2 (b) Random sample of size 100 are drawn with replacement from two populations and their means \bar{X}_1 and \bar{X}_2 are computed. If $\mu_1 = 10, \sigma_1 = 2, \mu_2 = 8, \sigma_2 = 1$, find the probability that the difference between a given pair of sample means is greater than 1.75 but less than 2.5.

Q.3 (a) It is claimed that an automobile is driven on the average no more than 12000 miles per year. To test this claim, a random sample of 100 automobile owners are asked to keep a record of the miles they travel. Would you agree with the claim if the random sample showed an average of 12500 miles and a standard deviation of 2400 miles?

Q.3 (b) Five samples of a ferrous-type substance are to be used to determine if there is a difference between a laboratory chemical analysis and an X-ray fluorescence analysis of the iron content. Each sample was split into two subsamples and the two types of analysis were applied. Following are the coded data showing the iron content analysis:

| Analysis | Sample | | | | |
|----------|--------|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 |
| X-ray | 2.0 | 2.0 | 2.3 | 2.1 | 2.4 |
| Chemical | 2.2 | 1.9 | 2.5 | 2.3 | 2.4 |

Assuming that the populations are normal, test at the 0.05 level of significance whether the two methods of analysis give, on the average, the same result.

Q.4 (a) There are 7 red and 5 black balls in a box. Three balls are to be selected one after the other. What is the probability of selecting a red ball followed by the black and red ball. (5)

Q.4 (b) A random sample of 200 married men, all retired, was classified according to education and number of children.

| Education | No. of children | | |
|------------|-----------------|-------|----|
| | 0 - 1 | 2 - 3 | >3 |
| Elementary | 14 | 37 | 32 |
| Secondary | 19 | 42 | 17 |
| College | 12 | 17 | 10 |

Test the hypothesis of independence of the two criteria of classification. (5)