

Time: 1 hour

Max Marks : 25

Note: All questions are compulsory.

1. (a) What are the two types of errors in hypothesis testing?
(b) When do we use t distribution for constructing a confidence interval for estimating Population mean μ ?
(c) What are sampling and non-sampling errors and how a researcher can control them?
(d) How do probability sampling techniques or random sampling techniques differ from non-probability sampling techniques or non-random sampling techniques?
(e) Explain the important properties of a normal distribution. (2 x 5)
2. A continuous manufacturing process produces items whose weights are normally distributed with a mean weight of 800 gms and a standard deviation of 300 gms. A random sample of 16 items is to be drawn from the process. (a) What is the probability that the arithmetic mean of the sample exceeds 900 gms? Interpret the results. (b) Find the values of the sample arithmetic mean within which the middle 95 per cent of all sample means will fall. (5)
3. The mean life time of a sample of 400 fluorescent light bulbs produced by a company is found to be 1600 hours with a standard deviation of 150 hours. Test the hypothesis that the mean life time of the bulbs produced in general is higher than the mean life of 1570 hours at $\alpha = 0.01$ level of significance. (5)
4. A brokerage survey reports that 30 per cent of individual investors have used a discount broker, i.e. one which does not charge the full commission. In a random sample of 9 individuals, what is the probability that (a) exactly two of the sampled individuals have used a discount broker? (b) not more than three have used a discount broker (c) at least three of them have used a discount broker. (5)