INFERENTIAL STATISTICS

1 MARK QUESTIONS

1. The mean of t-distribution is

(A) 0 (B) 1 (C) 2 (D) not defined

[March, 2025]

2. If the calculated value of $|t| < t_v(\alpha)$, then the null hypothesis is :

(A) rejected
(B) accepted
(C) cannot be determined
(D) neither accepted nor rejected

[March, 2024]

3. If the calculated value of $|t| < t_v(\alpha)$, then the null hypothesis is :

(A) rejected
(B) accepted
(C) cannot be determined
(D) neither accepted nor rejected

[March, 2023]

4. If for the purpose of t-test of significance, a random sample of size (n) 34 is drawn from a normal population, then the degree of freedom (N) is :

(A) 32 (B) 33 (C) 35 (D) 36

[July, 2025]

5. A specific characteristic of a sample is known as a :

(A) population
(B) parameter
(C) statistic
(D) variance

[July, 2024]

6. The test statistic for a one sample t-test, denoted by t, is defined as :
where μ is the population mean and $\bar{x}$ is the sample mean.

(A) $t = \frac{\bar{x} - \mu}{\left(\frac{s}{\sqrt{n}}\right)}$ (B) $t = \frac{\bar{x} - \mu}{\left(\frac{s}{n}\right)}$

(C) $t = \frac{\bar{x} - \mu}{\left(\frac{s^2}{n}\right)}$ (D) $t = \frac{\bar{x} - \mu}{\left(\frac{s}{n^2}\right)}$

[July, 2024]

7. For a student's t-test, the test statistic t is given by

(A) $t = \bar{x} - \mu$ (B) $t = \frac{\bar{x}}{s}$

(C) $t = \frac{\bar{x} - \mu}{s}$ (D) $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n-1}}}$

[July, 2023]

8. The central limit theorem states that if the sample size_____

(A) increases then sampling distribution must approach normal distribution
(B) decreases then the sample distribution must approach normal distribution
(C) increases then the sampling distribution much approach an exponential distribution
(D) decreases then the sampling distribution much approach an exponential distribution

[SQP 25-26]

9. Two groups of students from different schools are tested for their average mathematics scores. Group 1 has 12 students, and Group 2 has 10 students. What is the degree of freedom for this independent two-sample t-test? [NOT IN SYLLABUS THOUGH PRESENT IN SQP]

(A) 20 (B) 21 (C) 19 (D) 22

[SQP 25-26]

10. For the purpose of t − test of significance, a random sample of size (n) 2025 is drawn from a normal population, then the degree of freedom (υ) is

(A) 2025^{2025} (B) 2025^{2024}

(C) 2025 (D) 2024

[SQP 24-25]

11. Sampling which provides for a known non-zero equal chance of selection is

(A) Systematic sampling
(B) Convenience sampling
(C) Quota sampling

(D) Purposive sampling

[SQP 24-25]

12. Which of the following is a statistic

(A) μ (B) $\bar{x}$ (C) σ^2 (D) None

[SQP 23-24]

13. In one sample t- test, the estimation for population mean is

(A) $\frac{\bar{x}-\mu}{\left(\frac{S}{\sqrt{n}}\right)}$ (B) $\frac{\bar{x}-\mu}{\left(\frac{S}{n}\right)}$

(C) $\frac{\bar{x}-\mu}{\left(\frac{S^2}{n}\right)}$ (D) $\frac{\bar{x}-\mu}{\left(\frac{S}{n^2}\right)}$

[SQP 23-24]

14. A machine makes car wheels and in a random sample of 26 wheels, the test statistic is found to be 3.07. As per the t-distribution test (of 5% level of significance), what can you say about the quality of wheels produced by the machine? (Use $t_{25}(0.05) = 2.06$)

(A)Superior quality (B) Inferior quality

(C) Same quality (D) Cannot say

[SQP 22-23]

15. For the purpose of t-test of significance, a random sample of size (n) 34 is drawn from a normal population, then the degree of freedom (v) is -

(A) 1/34 (B) 33 (C) 34 (D)) 35

[SQP 22-23]

16. Standard deviation of a sample from a population is called a –

(A) Standard error (B) Parameter

(C) Statistic (D) Central limit

[SQP 22-23]

17. A grain whole-seller visits the granary market. While going around to make a good purchase, he takes a handful of rice from random sacks of rice, in order to inspect the quality of farmers produce. The handful of rice taken from a sack of rice for quality inspection is a:

(A) statistic (B) population

(C) parameter (D) sample

[SQP 22-23]

18. In a school, a random sample of 145 students is taken to check whether a student's average calory intake is 1500 or not. The collected data of average calories intake of sample students is presented in a frequency distribution, which is called a:

(A) Statistics (B) Sampling distribution

(C) Parameter (D) Population Sampling

[SQP22-23]

2 MARKS QUESTIONS

19. Consider the following hypothesis :

$H_0 : \mu = 35$

$H_1 : \mu \neq 35$

A sample of 81 items is taken whose mean is 37 5 and the standard deviation is 5. Test the hypothesis at 5% level of significance. 2 [Given : Critical value of Z for a two-tailed test at 5% level of significance is 1.96]

[March, 2022]

20. Fill in the blanks :

(a) t-distribution curve is symmetrical about the line _____.

(b) The variable t of t-distribution lies between _____.

(c) The mean of the t-distribution is _____.

(d) The variance of the t-distribution is _____.

[July, 2025]

21. A bulb producing factory claims that its bulb has a mean life of 20 months. A random sample of 8 such bulbs gave the following values:

Life of bulbs (in months): 24, 22, 27, 18, 20, 24, 22, 19

Test the factory claim at 5% level of significance. [given $t_{(7, 0.05)} = 2.36$]

[July, 2022]

22. A machine produces washers of thickness 0.50mm. To determine whether the machine is in proper working order, a sample of 10 washers is chosen for which the mean thickness is 0.53mm and the standard deviation is 0.03mm. Test the hypothesis at 5% level of significance that the machine is working in proper order. [Given $t_9(0.05) = 2.262$]

[SQP 23-24]

23. A sampling distribution of the sample means X is formed from a population with mean weight $\mu = 60kg$ and standard deviation $\sigma = 9kg$. What is the expected value and standard deviation of X , if sample size is 36?

[SQP 21-22]

3 MARKS QUESTIONS

24. A machinist is making engine parts with axle diameter of 0.7 cm. A random sample of 10 parts shows mean diameter 0.742 cm with a standard deviation of 0.04 cm. On the basis of this sample, find if you would say that the work is inferior. (Given t_9 (0.05) = 2.262)

[March, 2025]

25. The mean weekly sales of a 4-wheeler was 50 units per agency in 20 agencies. After an advertising campaign, the mean weekly sales increased to 55 units per agency with standard deviation of 10 units. Test whether the advertising campaign was successful. (Given $\sqrt{5}$ = 2.24, $t_{19}(0.05) = 1.729$)

[March, 2024]

26. The mean weekly sales of a four-wheeler were 50 units per agency in 20 agencies. After an advertising campaign, the mean weekly sales increased to 55 units per agency with standard deviation of 10 units. Test whether the advertising campaign was successful. (Use $t_{0.05}$ = 1·729 for 19 d.f.)

[March, 2023]

27. Ten cartons are taken at random from an automatic packing machine. The mean net weight of the ten cartons is 11·8 kg and standard deviation is 0·15 kg. Does the sample mean differ significantly from the intended mean of 12 kg ? [Given that for d.f. = 9, $t_{0.05}$ = 2·26]

[March, 2022]

28. Ten students are selected at random from a college and their heights (in cm) are found to be 100, 104, 108, 110, 118, 120, 122, 124, 126 and 128. In the light of the data, discuss the conclusion that the mean height of the students of the college is 110 cm. [Given : t_9 (0.05) = 2.262]

[July, 2024]

29. Hole punching machine is set to punch a hole 1.84 cm in diameter in a strip of sheet metal in a manufacturing process. The strip of metal is then creased and sent on to the next phase of production, where a metal rod is slipped through the hole. It's important that the hole be punched to the specified diameter of 1.84 cm. To test punching accuracy, technicians randomly sampled 16 punched holes and measured the diameters. The sample data (in centimetres) has a mean of 1.85 and variance 0.0064. Set up null and alternate hypothesis to test if the machine is working properly (whether the holes are being punched an average of 1.84 centimetres), at an alpha level of 0.05. Assume the punched holes are normally distributed in the population. Given: [$t_{(0.05,15)} = 2.131$]

[SQP 25-26]

30. The manufacturer of electrical items makes bulbs and claims that these bulbs have a mean life of 25 months. The life in months of a random sample of 6 such bulbs are given to be 24, 26, 30, 20, 20 and 18. Test the validity of the manufacturer's

claim at 1% level of significance. [Given t_5 (0.01) = 4.032]

[SQP 24-25]

31. A machine produces washers of thickness 0.50 mm. To determine whether the machine is in proper working order, a sample of 10 washers is chosen for which the mean thickness is 0.53mm and the standard deviation is 0.03 mm. Test the hypothesis at 5% level of significance that the machine is working in proper order. [*Given critical value,* $t_{0.025} = 2.262$ *at* $v(d.f) = 9$]

[SQP 21-22]