1. Explain the following terms :

   i) Null hypothesis ii) Type I and Type II error iii) confidence limits iv) alternative hypothesis v) significance level

2. A machinist is making engine parts with axle diameter of 0.7 inch. A random sample of 10 parts shows mean diameter 0.742 inch with a S.D. of 0.04 inch. Based on this sample, would you say that the axle is inferior?

3. A manufacturer claimed that at least 95% of the equipment which he supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 of them were faulty. Test his claim at a significance level of 1% and 5%.

4. Genetic theory states that children having one parent of blood type M and the other of blood type N will always be one of the three types M, MN, N and that the proportions of these types will on an average be 1:2:1. A report states that out of 300 children   having one M parent and one N parent, 30% were found to be of type M, 45% of type MN and the remainder of type N. Test the theory by χ^2(Chi square) test.

5. State Central limit theorem. Use the theorem to evaluate $P[50 < \bar{X} < 56]$ where $\bar{X}$ represents the mean of a random sample of size 100 from an infinite population with mean $\mu = 53$ and variance $\sigma 2 = 400$

6. A random sample of size 25 from a normal distribution $N(\mu, \sigma 2 = 4)$ yields, sample mean $\bar{X} = 78.3$. Obtain a 99% confidence interval for μ.

7. Let the observed value of the mean $\bar{X}$ of a random sample of size 20 from a normal distribution with $mean\ \mu$ and variance $\sigma 2 = 80$ be 81.2. Find a 90% and 95% confidence intervals for μ.

8. In a recent study reported on the Flurry Blog, the mean age of tablet users is 34 years. Suppose the standard deviation is 15 years. Take a sample of size $n = 100$. Using central limit theorem, find the probability that the sample mean age is more than 30 years.

9. Three different kinds of food are tested on three groups of rats for 5 weeks. The objective is to check the difference in mean weight (in grams) of the rats per week. Apply one-way ANOVA using a 0.05 significance level to the following data:

Food 1	8	12	19	8	6	11
Food 2	4	5	4	6	9	7
Food 3	11	8	7	13	7	9

10. Set up an analysis of variance table for the following per acre production data for three varieties of wheat, each grown on 4 plots and state it the variety differences are significant at 5% significant level

Per acre production data			
Plot of land	Variety of Wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

11. Analyze and interpret the following statistics concerning output of wheat per field obtained as a result of experiment conducted to test four varieties of wheat viz. A, B, C and D under a Latin- square design

C	B	A	D
25	23	20	20
A	D	C	B
19	19	21	18
B	A	D	C
19	14	17	20
D	C	B	A
17	20	21	15