Syllabus:
1. **Hypothesis testing**
2. **Estimation**

1. Null and alternate hypotheses are statements about:  
   (Marks - 1)  
   i) Population parameter  
   ii) Sample parameter  
   iii) Sample statistic  
   iv) None of these

2. In hypothesis testing a type-II error occurs when-  
   (Marks - 1)  
   i) The null hypothesis is not rejected when the null hypothesis is true  
   ii) The null hypothesis is rejected when the null hypothesis is true  
   iii) The null hypothesis is not rejected when the alternate hypothesis is true  
   iv) None of these

3. The null and alternative hypotheses divide the sample space into:  
   (Marks - 1)  
   i. two sets that overlap  
   ii. two non-overlapping sets  
   iii. Both of these  
   iv. None of these

4. A two-tailed test is one where:  
   (Marks - 1)  
   i. results in only one direction can lead to rejection of the null hypothesis  
   ii. negative sample mean leads to rejection of the null hypothesis  
   iii. results in either of two directions can lead to rejection of the null hypothesis  
   iv. None of these

5. If random samples of size $\geq 30$ are drawn from a population with known population variance ($\sigma^2$), the sample means follow:  
   (Marks - 1)  
   i) F-distribution  
   ii) normal distribution  
   iii) t-distribution  
   iv) $\chi^2$ distribution

6. A random sample of size $n = 4$ is drawn from a population with $\mu = 200$, $\sigma^2 = 100$. Test the hypothesis for the following conditions and choose the correct one: $H_0: \mu = 200$ and $H_1: \mu > 200$, when the sample mean is 214.  
   (Marks - 1)  
   i) Null hypothesis is rejected  
   ii) Alternate hypothesis is accepted  
   iii) Cannot be determined
7. Using the data given in Q. 6, set the hypotheses for a two-tailed test.  
   i) \( H_0: \mu = 200 \) and \( H_1: \mu < 200 \)  
   ii) \( H_0: \mu = 200 \) and \( H_1: \mu > 200 \)  
   iii) \( H_0: \mu = 200 \) and \( H_1: \mu \neq 200 \)  
   iv) None of the above.  

(Marks - 1)

8. Choose the correct 95% confidence interval (CI) of population mean \( (\mu) \) for the given information that: (i) it is a normal population, (ii) population standard deviation, \( \sigma = 3.50 \), (iii) sample size \( n = 30 \), (iv) sample mean = 20.  
   a) \( (18.75 \leq \mu \leq 21.25) \)  
   b) \( (25.00 \leq \mu \leq 30.25) \)  
   c) \( (35.00 \leq \mu \leq 39.25) \)  
   d) \( (37.75 \leq \mu \leq 48.25) \)  

(Marks – 2)

9. Consider Q. 8. Choose the correct 95% CI of \( \mu \) when \( \sigma \) is unknown, and sample standard deviation \( (s) \) is 4.25.  
   a. \( (28.75 \leq \mu \leq 30.25) \)  
   b. \( (29.75 \leq \mu \leq 35.00) \)  
   c. \( (36.75 \leq \mu \leq 38.25) \)  
   d. \( (18.48 \leq \mu \leq 21.52) \)  

(Marks – 2)

10. A 95% confidence interval for the mean of a population is such that:  
    i) It contains 95% of the values of the population  
    ii) There is a 95% chance that it contains all the values of the population.  
   iii) There is a 95% chance that it contains the mean of the population  
    iv) None of these  

(Marks – 1)

11. A researcher computes a 95% confidence interval for \( \mu \) whereas \( \sigma \) is known. The CI is 18000 to 22000, the value of the sample mean is:  
   i) 81000  
   ii) 90000  
   iii) 20000  
   iv) None of these  

(Marks – 2)

12. In a hypothesis testing of equality of two population means, i.e., \( H_0: \mu_1 = \mu_2 \), the test statistic follows t-distribution. If two independent samples of size \( n_1 = n_2 = n \) are collected from the two populations, respectively, the degrees of freedom of the test statistic is equal to:  
   i) \( 2n - 1 \)  
   ii) \( 2n - 2 \)  
   iii) \( n - 2 \)  
   iv) None of these  

(Marks – 1)