

Exam. Code : 103205

Subject Code : 1230

B.A./B.Sc. 5<sup>th</sup> Semester

## QUANTITATIVE TECHNIQUES

## (Quantitative Techniques-V)

Time Allowed—3 Hours]

[Maximum Marks—100

**Note** :- Attempt **five** questions in all. Question No. **1** is compulsory and attempt **one** question from each of the **four** units.

1. (i) Define z-distribution.
- (ii) What is chi-square distribution ?
- (iii) Distinguish between null and alternative hypothesis.
- (iv) Define power of test.
- (v) Distinguish between point estimators and interval estimators.
- (vi) Explain level of significance.
- (vii) What is F-test ?
- (viii) What is test of significance ?
- (ix) What do you understand by analysis of variance ?
- (x) What are the assumptions of analysis of variance ?

10×2=20

## UNIT-I

2. Define T-distribution and derive its main properties. 20  
 3. Derive the main properties of F-distribution. 20

## UNIT-II

4. (a) Explain the properties of a good estimator.  
 (b) Prove that for the binomial population with density function  $f(x, p) = {}^n C_x p^x q^{n-x}$ ,  $x = 1, 2, \dots, n$

the maximum likelihood estimator  $p$  is  $\frac{x}{n}$ . 10,10

5. (a) Define maximum likelihood estimators and discuss its properties.  
 (b) Write short notes on :  
 (i) One tailed and two tailed tests.  
 (ii) Critical region. 10,10

## UNIT-III

6. (a) Test the significance of the correlation coefficient  $r = 0.5$  from a sample of size 18 against hypothesis correlation coefficient 0.7.  
 (b) A certain drug is claimed to be effective in curing cold. In an experiment on 500 persons with cold, half of them were given the drug and half of them were given the sugar pills. The patients' reactions to the treatment are recorded in the following table :

	Helped	Harmed	No effect	Total
Drug	150	30	70	250
Sugar Pills	130	40	80	250
Total	280	70	150	500

On the basis of the data can it be concluded that there is a significant difference in the effect of the drug and sugar pills ?

[The table value of chi-square for two degrees of freedom = 5.99] 10,10

7. (a) Intelligence test on two groups of boys and girls gave the following results :

	Mean	S.D.	N
Girls	75	15	150
Boys	70	20	250

Is there a significant difference in the mean scores obtained by boys and girls ?

- (b) In a sample of 8 observations, the sum of squared deviations of items from the mean was 84.4. In another sample of 10 observations, the value was found to be 102.6. Test whether the difference is significant at 5% level of significance.

[You are given that at 5% level table value of F for  $v_1 = 7, v_2 = 9$  is 3.29] 10,10

#### UNIT-IV

8. Explain the technique of analysis of variance for two way classifications. 20
9. To test the significance of the variation of the retail prices of a commodity in three principal cities Bombay, Calcutta and Delhi, four shops were chosen at random in each city and prices observed in rupees were as follows :

Bombay : 16    8    12    14

Calcutta : 14    10    10    6

Delhi : 4    10    8    8

Do the data indicate that the prices in the three cities are significantly different ?

(For  $v_1 = 2, v_2 = 9, F_{0.05} = 4.26$ ) 20