B.A./B.Sc. (Hons.) 4th Semester
(2055)
ECONOMICS
Paper : III Theory of Statistics

Time Allowed : Three Hours]   **[Maximum Marks : 90**

Note :— Attempt **FIVE** questions in all selecting **ONE** question from each unit. Question No. **1** is compulsory.

1. (a) Properties of Normal Distribution.

(b) Random Sampling Technique.

(c) Write words on Maximum Likelihood Estimates.

(d) Partial Regression — write formula of r_{xyz}.

(e) Properties of exponential growth curves.

(f) Chi square test.

(g) Define degrees of freedom.

(h) A certain medicine given to each 9 patients resulted in the following increase in blood pressure :

$$7, 3, -1, 4, -3, 5, 6, -4, -1$$

Can it be concluded that the medicine will in general be accompanied by an increase in blood pressure ? (Given $t_{.05}(8) = 2.0306$)

(i) What is probability density function ?

(j) Difference between one way and two way ANOVA.

(k) Scattered correlation with diagram.

(l) Difference between t tests and chi square tests.   18

UNIT–I

2. Find the multiple regression equation of x_1 on x_2 and x_3 from the data given below :

x_1	:	3	5	6	8	12	14
x_2	:	13	10	6	4	2	1
x_3	:	20	14	10	4	0	4

Estimate best value of x_1 when $x_2 = 6$ and $x_3 = 15$ and interpret your result.   18

3. Explain the concept of :

(a) Mathematical Expectation

(b) Concept of random variable

(c) Moment generating function.   18

UNIT—II

4. (a) The sum of mean and variance of Binomial distribution is 15 and sum of their squares is 117. Find the distribution.   10

(b) An experiment succeed thrice as often as it fails. Find the probability that in the next 5 trials, there will be at least 3 successes.   8

5. Define Poisson Distribution with properties. Fit a Poisson Distribution to the following data and calculate theoretical frequencies.

X	0	1	2	3	4
f	109	65	22	3	1

Also, find mean and variance, given $e^{-0.01} = 0.5432$.   18

UNIT–III

6. Differentiate between :

(i)   One tailed and two tailed tests.

(ii) Point Estimation and internal estimation.   9+9

7. Discuss in detail types of sampling techniques.   18

UNIT–IV

8. (a) The mean yield of wheat from Patiala District was 210 kgs with a standard deviation 10 kgs per acre from a sample of 100 plots. In Ludhiana, the mean yield was 220 kgs with standard deviation 12 kgs from a sample of 150 plots. Assuming that the standard deviation of the yield in the entire state was 11 kgs, Test whether there is any significant difference between the mean yield of crops in the two districts ?

(b) Two Random samples from two normal populations are drawn and following information is given :

Population	Size of sample	Sum of observations	Sum of Square of observations
A	9	8.4	61
B	12	16.2	72.9

You are to decide if the two populations can be taken to have same variance. What test function would you use ? How it is distributed and what value it has in this sampling experiment ?   9+9

9. Discuss the non-parametric tests. The following data shows the number of automobile accidents per week in a certain city :

   12, 8, 20, 2, 14, 10, 15, 6, 9, 4

   Are these frequencies in agreement with the belief that accidents numbers were same during these 10 week period ?   18