Exam. Code : 103205
Subject Code : 1226

B.A./B.Sc. Semester—V

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 chi square distribution.

    (ii)   What is Z-distribution ?

    (iii) Define Normal distribution.

    (iv)   What do you mean by critical region ?

    (v)   Distinguish between Null and Alternative hypothesis.

    (vi)   Define level of significance.

    (vii) What is t-test ?

    (viii) A random sample of 1000 numbers is found to have a mean of 3.67 cm. Can it be reasonably regarded as a random sample from a population with mean 3.25 cm and standard deviation 2.35 cm ?

    (ix)   What is analysis of variance ?

    (x)   What are the uses of analysis of variance ?

                                           10×2=20

UNIT—I

2. Derive the main properties of 't' distribution.   20

3. Define F-distribution and derive its main properties.

20

UNIT—II

4. (a) Discuss the properties of a good estimator.

   (b) Define maximum likelihood estimators and discuss its properties.   10,10

5. (a) Find the maximum likelihood estimate for the parameter λ of a Poisson distribution on the basis of sample size n. Also find its variance.

   (b) Discuss the procedure of testing a statistical hypothesis.   10,10

UNIT—III

6. For a 2×2 contingency table

a	b
c	d

prove that chi-square = $\dfrac{N(ad - bc)}{(a + b)(a + c)(c + d)(b + d)}$.

20

7. (a) Below are given the gain in weights in kg. of cows fed on two diets X and Y :

Diet X	25	32	30	32	24	14	32			
Diet Y	24	34	22	30	42	31	40	30	32	15

Test at 5% level whether the two diets differ as regards their effect on mean increase in weight.

(Table value of 't' for 15 degrees of freedom on at 5% = 2.131)

(b) Two samples of 100 electric bulbs each has a means 1500 and 1550. Standard deviation 50 and 60. Can it be concluded that two brands differ significantly at 1% level of significance in equality ? 10,10

UNIT—IV

8. Explain clearly the technique of analysis of variance for data with one-way classification. 20

9. You are given the following data indicating the number of units produced per day by five different workers using four different types of machines :

Machine Type

Workers	A	B	C	D
1	44	36	48	38
2	48	40	50	44
3	37	38	40	36
4	45	34	45	32
5	40	44	50	40

(i) Whether the mean productivity is the same for 4 different machine types ?

(ii) Whether the 5 workers differ with respect to mean productivity ? 20