

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 96

E

Your Roll No.....

Unique Paper Code : 237351

Name of the Course : B.A. (Program) Statistics

Name of the Paper : Statistical Methods – II

Semester : III

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt Six questions in all.
3. Q. No. 1 is compulsory.
4. Attempt Five more questions.
5. Simple calculator can be used.

1. (a) Fill in the blanks :

(i) Two attributes A and B are said to be positively associated if _____ .

(ii) Variance of a chi square distribution with n.d.f. is _____ .

(iii) Sampling distribution of _____ does not involve any population parameters and depends only on the degrees of freedom ν_1 and ν_2 .

(b) Define Yules coefficient of association and coefficient of colligation.

(c) Define critical region and level of significance.

(d) Describe paired t – test.

(e) Define stratified sampling.

(3×5)

P.T.O.

2. (a) A survey of 800 families with four children revealed the following distribution :

No. of boys	0	1	2	3	4
No. of Girls	4	3	2	1	0
No. of families	20	300	250	200	30

Is this result consistent with the hypothesis that male and female births are equally probable ?

- (b) Find the m.g.f. of a chi square variate with n d.f. (6,6)
3. (a) If X_1 and X_2 are two independent chi square variates with n_1 and n_2 d.f. respectively, then show that $U = \frac{X_1}{X_1 + X_2}$ is a $\beta_1\left(\frac{n_1}{2}, \frac{n_2}{2}\right)$ variate.
- (b) In a survey of buying habits 400 women shoppers are chosen at random in supermarket 'A' located in a certain section of the city. Their average weekly food expenditure is Rs. 250 with a standard deviation of Rs. 40. For 400 women shoppers chosen at random in supermarket 'B' in another section of the city, the average weekly food expenditure is Rs. 220 with standard deviation of Rs. 55. Test at 5% level of significance whether the average weekly food expenditure of the two populations of shoppers are equal. (6,6)
4. (a) Find mode of chi square distribution.
- (b) Ten students of Computer Sc. were given a test in C- Programming, They were given a month's tuition and a second test was held at the end of the tuition classes. Do the marks given below show enough evidence that the students have benefited from extra coaching ? Given $P[|t| > t_{9,0.1}] = 3.25$ and $P[|t| > t_{9,0.5}] = 2.26$

Students	1	2	3	4	5	6	7	8	9	10
Marks in first Test	23	20	19	21	18	20	18	17	23	16
Marks in Second test	24	19	22	19	20	22	20	20	25	19

(6,6)

5. (a) Calculate the coefficient of association between extravagance in fathers and sons from the following data :

Extravagant fathers with Extravagant sons = 327

Extravagant fathers with Miserly sons = 545

Miserly fathers with Extravagant sons = 741

Miserly fathers with Miserly sons = 234

Also tabulate for comparison the frequencies that would have been observed had there been no heredity.

- (b) Find mean and variance of F distribution with n_1 and n_2 d.f. (6,6)

6. (a) Find the limiting form of t-distribution for large n.

- (b) Out of 8000 graduates in a town 800 are females, out of 1600 graduate employees 120 are females. Can we conclude on the basis of the given data that distinction is made in the appointment on the basis of sex ? [Given values of χ^2 at 5% level of significance for 3 d.f. is 7.815 and values of χ^2 at 5% level of significance for 1 d.f. is 3.841]

	Employed	Not employed	Total
Male	1480	5720	7200
Female	120	680	800
Total	1600	6400	8000

(6,6)

7. (a) In two large populations, there are 30 percent and 25 percent blue eyed people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations?

P.T.O.

(b) Let $X \sim t_{(n)}$ then show that :

$$\mu_{2r+1} = 0$$

$$\mu_{2r} = n^r \frac{\Gamma\left(\frac{n}{2} - r\right) \Gamma\left(r + \frac{1}{2}\right)}{r \left(\frac{1}{2}\right)_r \left(\frac{n}{2}\right)_r}$$

and $\mu_{2r} = 0$; $r = 0, 1, 2, \dots$ (6,6)

8. Write short notes on :

(a) χ^2 - test for testing the independence of attributes.

(b) Applications of t - distribution.

(c) Relationship between F and t distributions. (4,4,4)