

P-8/2051

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B. Sc - CSM

10/4/MJ

Semester - IV

P-244 Paper - Statistical Inference - II

No. of sheets used: 02

Total no. of Questions: 9

Time allowed: 3 hours

Maximum Marks: 30

Instructions for the candidates: The candidates are required to attempt two questions each from Section A and B of the question paper and the entire section C which is compulsory. Each question from Section A and B carries 4 marks each. Section C contains 7 short answer type questions of 2 marks each.

### Section A

- Ques. 1** Two groups A and B consist of 100 people, each suffering from Corona virus. A serum is given to group A, but not to group B; otherwise the two groups are treated identically. It is found that in groups A and B, 75 and 65 people respectively recover from Corona virus. Test the hypothesis that the serum helps to cure the disease, by using  $\chi^2$  test.
- Ques. 2** Gabbie earned a score of 940 on a national achievement test. The mean test score was 850 with a sample Standard Deviation of 100. What proportion of students had a higher score than Gabbie? (Assume that the test scores are normally distributed).
- Ques. 3** A coefficient of correlation of 0.2 is derived from a random sample of 625 pairs of observations:
- Is this value significant?
  - What are the 95% and 99% confidence limits for the correlation coefficient in the population?
- Ques. 4** 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?

### Section B

- Ques. 5** In a sample of 1000 individuals, 100 possess attribute A and 300 possess attribute B. A and B are independent. How many individuals possess both A and B, and how many possess neither?

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- Ques.6** A buyer of electric bulb purchases 400 bulbs; 200 bulbs of each brand. Upon testing these bulbs, he found that brand A had an average life of 1225 hours with a standard deviation of 42 hours whereas brand B had a mean life of 1265 hours with a standard deviation of 60 hours. Can the buyer be certain that the two brands differ significantly in quality?
- Ques.7** The theory predicts that proportion of beans in four groups - A, B, C and D should be 9:3:3:1. In an experiment on 1600 beans, the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory?
- Ques. 8** Two independent samples have 28 and 19 pairs of observations with correlation coefficients 0.55 and 0.75 respectively. Are these values of  $r$  consistent with the hypothesis that both the samples are drawn from the same population?

### Section C

- Ques. 9** Write short answers to the following questions:
- Explain the  $F$  - test for testing the quality of two sample variances.
  - Describe the  $\chi^2$  test for independence of attributes, stating clearly the condition for its validity.
  - How can the Central Limit Theorem be used to test for large size sampling?
  - What is a  $t$ -distribution? Briefly enumerate the properties of a  $t$  - distribution?
  - What is meant by confidence limits? Why are they important in various tests used for significance?
  - A random sample of 27 pairs of observations from a normal population gives a correlation coefficient of 0.42. Is it likely that the variables in the population are uncorrelated?
  - Differentiate between Association and Independence of Attributes. When are attributes said to be independent?

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