

Roll Number

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SCHOOL OF CHEMICAL AND LIFE SCIENCES
B.Sc. (Hons with Research)/ B.Sc. (Hons) as per FYUP
Semester I (2024)
Paper Code: BTX MDC 101
Paper Title: BASICS OF STATISTICS

Time: 2 hours

Maximum Marks: 45

Write the Roll No. at the top immediately upon receipt of this Question Paper. Attempt all Questions. All parts of the Question must be attempted in continuation. Start Answering each Question on a new page.

SECTION A

Question 1. Fill in the blanks in the following questions. Answer all questions

[1x10 =10 marks]

- A. A survey in which information is collected from each and every individual of the population is known as _____.
- B. The number of classes and class interval for the distribution of marks from 0 to 100 of 50 students of a class should be _____ and _____, respectively.
- C. Histograms can be drawn only for _____ distributions.
- D. The mean of 8 numbers is 15. Afterward, a new number, 24, is added. The mean of the nine numbers is _____.
- E. The sum of squares of the deviations from the mean is always _____.
- F. If a variable takes some non-negative values $x_1, x_2, \dots, x_n$, then the inequality that holds between H.M., G.M., and A.M. is _____.
- G. If for an asymmetric distribution, the mean, median, and s.d. are 25, 15, and 10, respectively, the distribution is _____ skew.
- H. If two events, A and B, are disjoint, then the $P(A \cup B) =$ _____.
- I. The mean of binomial distribution $B(n, p)$ is _____, and its variance is _____.
- J. The number of independent values in a set of values is known as _____.

SECTION B

Question 2. Attempt ANY THREE questions from the following.

[5x3=15 marks]

- A. Name two kinds of statistical data and describe them in detail. Write the sources of these types of data.
- B. What do you understand by kurtosis? How do we ascertain kurtosis with the help of β_2 ? Discuss in detail using the graph.
- C. What is meant by hypothesis testing? Define the null hypothesis and alternative hypothesis. Write the step-wise procedure for testing the hypothesis.
- D. Define and elaborate on two types of errors in the testing of a hypothesis with the help of real-life examples.
- E. What do you understand by the correlation between two variables? Interpret the correlation coefficient values as -1, 1, and 0.

SECTION C

Question 3. Answer ANY TWO of the following questions.

[10 x 2=20 Marks]

- A. (i) Define the Poisson distribution with parameter λ and discuss the Poisson distribution additive property.
- (ii) In a book of 520 pages, 390 typo-graphical errors occur. Assuming Poisson law for the number of errors per page, find the probability that a random sample of 5 pages will contain no error.
- B. A sample analysis of examination results of 200 MBA's was made. It was found that 46 students had failed, 68 secured a third division, 62 secured a second division, and the rest were placed in the first division. Are these figures commensurate with the general examination result, which is in the 4 : 3 : 2 : 1 ratio for various categories, respectively? (χ^2 value at 5% level of significance for 3 d.f. = 7.815).
- C. A company has a head office in Kolkata and a branch in Mumbai. The personal director wanted to know if the workers at the two places would like the introduction of a new plan of work, and a survey was conducted for this purpose. Out of a sample of 500 workers at Kolkata, 62% favoured the new plan. Out of a sample of 400 workers in Mumbai, 41% were against the new plan. Write the null hypothesis and alternative hypothesis. Is there any significant difference between the two groups in their attitude towards the new plan at the 5% level? (Z value at 5% level of significance for the two-tailed test is 1.96).
- D. (i) What are the three axioms of probability? Discuss in detail.
- (ii) If $P(A) = 1/2$, $P(B) = 1/3$ and $P(A \cap B) = 1/4$, find $P(A^c)$, $P(A \cup B)$, $P(A/B)$ and $P(B/A)$. Are A and B independent?

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