

B. Sc. (Part-III) Examination, 2017
Mathematics- Fourth Paper (Optional)
(F) Mathematical Statistics

Note :- Answer any five questions in all. Question No. 1 is compulsory. Answer one question from each unit. Marks allotted to each question are indicated in the right hand margin.

1. Answer the following in brief : 3.5 × 10 = 35

(i) Explain the difference between Independent and Mutually Exclusive events.

(ii) Let the events A_1, A_2, \dots, A_k be independent and $P(A_i) = P_i$. Show that the prob that at least one of these events will occur is

$$1 - \prod_{i=1}^k (1 - p_i).$$

(iii) A random variable has the probability mass function as

$$P(x = k) = 2^{-k}, \quad K = 1, 2, \dots$$

$$= 0 \quad \text{elsewhere}$$

Show that $E(x) = 2$

(iv) If x is a binomial variate with mean 12 and variance 3, find $P(x \geq 1)$.

(v) The fourth central moment of a normal distribution is 10. Obtain its variance.

(vi) Write the relation between correlation and regression coefficients.

(vii) Define multiple correlation coefficient. Write its limits also.

(viii) Define Simple & Composite hypotheses.

(ix) Explain Hypothesis, level of significance and power of the test.

(x) Write Applications of χ^2 distribution in testing of hypothesis.

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Unit-I

2. A lot consists of 10 good articles, 4 with minor defects and 2 major defects. Two articles are chosen at random, find the probability that.

(a) Both are good

(b) Neither is good

(c) At most one is good

(d) Exactly one is good **10 Or**

3. A & B throw with one dice for a stake of Rs. 44 which is to be won by the player who first throws 6. If A has the first throw, what are their respective expectations.

4. Define Binomial distribution. Obtain its mgt and derive from it the mean and variance of the distribution. **10 Or**
5. (a) Define Cauchy's distribution. Find its first two moments if they exist. If moments does not exist explain why. **10**
- (b) Define Normal distribution and find its r^{th} moment.

Unit-III

6. Why there are two regression lines. Explain regression coefficient. Prove that correlation coeff. is the geometric mean of the regression coefficients. **10 Or**
7. Two lines of regression are given by $x + 2y = 5$ and $2x + 3y = 8$ and $\sigma_x^2 = 12$, calculate the values of $\bar{x}, \bar{y}, \sigma_y^2$ and r . **10**

Unit-IV

8. Describe critical region, Type I & Type II errors and level of significance. How a test statistic is obtained for $H_0 : \mu = 2$ vs. $H_1 : \mu \neq 2$ for on sample of size one from normal population with mean μ and variance 2. **10 Or**
9. (a) Discuss F-distribution and write its use in analysis of variance. **10**
- (b) Discuss large sample test.

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