

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.Sc. SECOND SEMESTER (January – June) 2015

Mid-Semester Examination, March 2015

Date : 20/03/2015

STATISTICS (General)

Time : 12 noon – 1 pm

Paper : II

Full Marks : 25

[Use a separate answer book for each group]

Group – A

(Answer any three questions)

1. Let $X \sim \text{binomial}(2, p)$ and let $Y \sim \text{binomial}(4, p)$. If $P[X \geq 1] = \frac{5}{9}$, Find $P[Y \geq 1]$. [5]
2. Let X have a geometric distribution. Show that $P[X \geq K + j | X \geq K] = P[X \geq j]$ where K and j are non-negative integers. [5]
3. Let X have a Poisson distribution. If $P[X=1] = P[X=3]$, find the mode of the distribution. [5]
4. In the manufacture of car tyres, a particular production process is known to yield 10 tyres with defective walls in every batch of 100 tyres produced. From a production batch of 100 tyres, a sample of 4 is selected for testing. Find
 - a) The probability that the sample contains 1 defective tyre. [3]
 - b) The variance of the number of defectives in samples of size 4. [2]

Group – B

(Answer any two questions)

5. What do you mean by Multiple Correlation? Show that multiple correlation coefficient $R_{1 \cdot 23}$ can be expressed as $R_{1 \cdot 23}^2 = 1 - \frac{R_{11}}{R_{22}}$ in usual notation. [5]
6. What is Partial Correlation Coefficient? Show that $r_{12 \cdot 3} = \frac{r_{12} - r_{13} \cdot r_{23}}{\sqrt{(1 - r_{13}^2)} \sqrt{(1 - r_{23}^2)}}$. [5]
7. Prove the following relationship $1 - R_{1 \cdot 23}^2 = (1 - r_{12}^2)(1 - r_{13 \cdot 2}^2)$ for a trivariate distribution. [5]

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