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Code No. 3007

FACULTY OF SCIENCE

B.Sc. I-Semester (CBCS) Examination, November / December 2018

Subject : Statistics

Paper – I : Descriptive Statistics and Probability

Time : 3 Hours **Max. Marks: 80**

PART – A (5 x 4 = 20 Marks)
(Short Answer Type)
Note : Answer any FIVE of the following questions.

1 Define Arithmetic mean, Geometric mean and Harmonic mean.
2 Define Central and Non-central moments. State their interrelationship.
3 Define (i) Independence of events (ii) airwise and independence and (iii) mutual independence of events.
4 Prove that for any three events A, B and C
$P(A \cup B / C) = P(A / C) + P(B / C) - P(A \cap B / C)$
5 Define distribution function and state its properties.
6 The random variable X has an exponential distribution, $f(x) = e^{-x}, 0 \le x < \infty$. Find the density function of the random variable Y = 3X + 5
7 Define Mathematical expectation of a random variable. Find the expectation of the number on a die when thrown.
8 What is the effect of change of origin and scale on moment generating function?

PART – B (4 x 15 = 60 Marks)
(Essay Answer Type)
Note: Answer ALL questions.

9 (a) Define Primary data. What are the different methods of collecting and editing of primary data? Describe any one method in detail with example.

OR

(b) (i) Explain the concept of skewness. Obtain the limits for Karl Pearson's coefficient of skewness.
(ii) The first four moments of a distribution about the value 4 are 1, 4, 10 and 45 respectively. ? Compute coefficient of skewness, Kurtosis and comment upon the results.

10 (a) (i) Define Axiomatic approach to probability.
(ii) Prove that for any two events A and B
$P(A \cap \overline{B}) = P(A) - P(A \cap B)$
(iii) The chances of solving a problem of three persons X, Y and Z are $\frac{1}{3}, \frac{1}{2}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved?

OR

(b) State and prove multiplication theorem of Probability for 'n' events.

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11 (a) (i) Define discrete and continuous Random variables.
(ii) A continuous random variable X has the following p.d.f.

$$f(x) = \begin{cases} ax, & 0 \le x \le 1 \\ a, & 1 \le x \le 2 \\ -ax + 3a, & 2 \le x \le 3 \\ 0, & elsewhere \end{cases}$$

Determine the constant 'a', compute $P(x \le 1.5)$ and $P(x > 2.5)$

OR

(b) The joint p.d.f. of X and Y is given by

$$f(x,y) = \frac{1}{8}(6 - x - y), \quad 0 \le x < 2, \quad 2 < y < 4$$
$$= 0 \quad , \quad otherwise$$

Find (i) $P(X < 1 \cap Y < 3)$ (ii) $P(X + Y < 3)$ (iii) $P(X < 1 / Y < 3)$

12 (a) (i) State and prove addition theorem of Mathematical Expectation.
(ii) A coin is tossed until a head appears. What is the expectation of the number of tosses required.

OR

(b) (i) Define characteristic function of a random variable and state its properties and also prove any one of its properties.
(ii) State and prove Chebyshev's inequality.

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