Code No. 2025

FACULTIES OF ARTS AND SCIENCE

B.A. / B.Sc. I – Year Examination, March / April 2016

Subject : STATISTICS (Theory)

Paper – I : Descriptive Statistics and Probability Distributions

Time : 3 hours Max. Marks : 100

Note : Answer all questions. Answer questions I to IV by choosing any two from each and any three from question V. All questions carry equal marks. Scientific calculators are allowed.

I 1 a) Distinguish between primary data and secondary data.

b) What do you understand by coefficient of variation? The average runs scored by three batsman A, B and C in a series of 10 innings are 50, 48 and 12. The standard deviations of their runs are 15, 12 and 2 respectively. Who is more consistent of the three batsman?

2 a) Define the raw and central moments of a frequency distribution. What will be the effect of change of origin and scale on these.

b) Show that for a frequency distribution, the coefficient of kurtosis is greater than unity.

3 State and prove addition theorem of probability for n events.

4 a) If A and B are independent events then show that $\overline{A}$ and $\overline{B}$ are also independent.

b) If $P(A\cup B)=\frac{5}{6}$; $P(A\cap B)=\frac{1}{3}$ and $P(\overline{B})=\frac{1}{2}$. Prove that the events A and B are independent.

II 5 Let Y be the random variable with the pdf

$$f(y)=\begin{cases}\frac{3}{64}y^2(4-y), & 0\le y\le 4\\ 0, & \text{elsewhere}\end{cases}$$

a) Find the expected value and variance of Y.

b) Let X = 300 y + 50. Find E(X) and Var(X).

6 a) Write the procedure for transformation of one-dimensional random variable.

b) If f(x) = 2x ; 0 < x < 1, find the probability density function of $Y = 8x^3$.

7 Define MGF and CGF of a random variable. What is the effect of change of origin and scale on MGF and CGF?

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8 a) State and prove Chebyshev's inequality.
b) A discrete random variable X takes the values 0, 1, 2, 3 with probabilities $\frac{1}{8}, \frac{3}{8}, \frac{3}{8}, \frac{1}{8}$ respectively. Evaluate $P\{|x - \mu| \geq 2\sigma\}$.

III 9 Define Binomial distribution. Obtain its MGF and hence find mean and variance.

10 a) Show that Poisson distribution satisfies the reproductive property.
b) The number of monthly breakdowns of a computer is a random variable X having a Poisson distribution with mean 2. Find the probability that this computer will function for a month
i) without a breakdown ii) with exactly one breakdown.

11 Define Negative Binomial Distribution. Derive its moment generating function and hence show that mean < variance.

12 Prove that Binomial distribution is the limiting case of Hyper Geometric distribution by stating the conditions.

IV 13 The mean and variance of a continuous uniform random variable X are 1.5 and 0.75 respectively.
i) Obtain the probability density function of X.
ii) Obtain the Quartiles and Quartile deviation.

14 Show that for a Normal Distribution QD : MD : SD : : 10 : 12: 15.

15 i) Mention the chief characteristics of normal distribution.
ii) Suppose that during transcendental meditation the reduction in consumption of oxygen by a person is a random variable having normal distribution with mean 37.6 cc per minute and standard deviation 4.6 cc. Find the probability that during meditation this reduction will be atmost 35.0 cc. [Table values : $P(0 < Z < 0.56) = 0.2128$].

16 Define Beta distribution of second kind. Find its mean and variance.

V Write short note on any **three** of the following :

17 Difference between Questionnaire and schedule
18 Baye's theorem
19 Cauchy – Schwartz's inequality
20 Additive property of Gamma distribution
21 Lack of memory property of exponential distribution

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