(i) Printed Pages : 4 Roll No. .....

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B.A./B.Sc. (General) 1st Semester

1125

STATISTICS

Paper : 101 – Probability Theory and Descriptive Statistics–I

Time Allowed : 3 Hours] **[Maximum Marks : 65**

Note :– (i) Attempt **five** questions in all, including the **first** compulsory question and **two** questions from each section.

(ii) Use of simple non-programmable calculators is allowed.

(iii) Statistical tables and log tables will be provided on demand.

(iv) Various symbols used have their usual meaning.

(Compulsory Question)

1. (a) Write down the usefulness of Box and Whisker plot.

(b) Explain the procedure of Sheppard's correction for moments.

(c) State any three properties of expectation of a random variable.

(d) Distinguish between population and sample.

(e) Define addition rule of probabilities with interpretation.

3,3,3,2,2

SECTION–I

2. (a) Define :

(i) Equally likely events

(ii) mutually exclusive events

(iii) independent events

(iv) exhaustive events.

(b) Suppose that A and B are independent events associated with an experiment. If the probability that A or B occurs equals 0.6, while the probability that A occurs equals 0.4, determine the probability that B occurs. 6,7

3. (a) It is known that the population of a certain city is 45% female and 55% male. Suppose that 70% of the males and 10% of the females smoke. Find the probability that a smoker is male.

(b) Define cumulative distribution function (cdf) of a random variable and state its properties.

(c) Let X be a random variable with probability mass function given as :

$$P(X = x) = \begin{cases} x/10, x = 0,1,2,3,4 \\ 0 \text{ elsewhere} \end{cases}$$

Find $P\{1/3 < X < 7/2 | X > 1\}$ 5,4,4

4. (a) Define moment generating function of a random variable. For a random variable X taking the value n with probability $1/2^n$, $n = 1,2,.....$, find the moment generating function and hence find the mean of X.

(b) Define expectation of a random variable and if possible values of a random variable X are 0, 1, 2,....., then show that :

$$E(X) = P(X > 0) + P(X > 1) + P(X > 2) + ...$$

(c) An unbiased die is tossed. Calculate its expected face value.

5,5,3

5. (a) Define the following and illustrate them with the help of an example :

(i) Two dimensional random variables

(ii) Marginal and Conditional Distributions.

(b) Discuss axiomatic approach to probability and state its properties.

(c) Define the concept of finding moments of a random variable and illustrate with an example. 4,5,4

SECTION–II

6. (a) Discuss range and standard deviation as measures of dispersion, including their merits, demerits and properties. The following table represents Hb level and blood pressure (BP) of 5 employees of a company :

Hb in gm%	5	10	10	15	10
BP in mm/Hg	70	71	72	72	70

Check which one out of Hb and BP is more consistent ?

(b) A distribution is negatively skewed with the coefficient of skewness as –29. The value of mean and mode are 125 and 138 respectively. Find variance of the distribution.

10,3

7. Explain the advantages of graphical representation of a frequency distribution. Develop a frequency distribution with the help of a data set of your choice and draw :

(i) a histogram

(ii) a frequency polygon

(iii) cumulative frequency curves and

(iv) stem-and-leaf display.

Also interpret all the diagrams 13

8. (a) Define Central Tendency and discuss median and mode with their advantages and disadvantages.

(b) The mean and standard deviation of a set of 60 observations were found to be 120 and 32, respectively. Adjust both the quantities for a wrong entry of 80 in place of 110. 7,6

9. (a) What do you understand by Kurtosis ? How is it measured ? Distinguish clearly, by giving figures, between different types of kurtosis.

(b) Discuss about qualitative and quantitative types of data and illustrate with examples.

(c) Write down in detail the steps involved in the construction of a questionnaire. Also discuss about various types of questionnaires. 4,3,6