Faculty of Science
B. Sc (Statistics) I-Year, CBCS-I Semester
Backlog Examinations –June/July, 2022
PAPER: Descriptive Statistics and Probability

Time: 3 Hours

Max Marks: 80

Section-A

I. Answer any *five* of the following

(5x4=20 Marks)

1. Distinguish between a questionnaire and schedule.
2. Explain the concept of kurtosis.
3. Write a short note on axiomatic definition of probability.
4. For any two events A and B, show that $P(A \cap B) \le P(A) \le P(A \cup B) \le P(A) + P(B)$.
5. Define i) probability mass function ii) probability density function.
6. Define distribution function of a random variable. Also state its properties.
7. Show that $V(a X+b) = a^2 V(X)$.
8. State and prove multiplication theorem of expectation for two variables.

Section-B

II. Answer the following questions

(4x15=60 Marks)

9. (a) Explain the methods of collecting primary data with advantages and Disadvantages.

(OR)

   (b) Define Raw and central moments. Establish the relationship between the moments about the mean in terms of moments about any arbitrary point.

10. (a) State and prove addition theorem of probability for n events.

(OR)

   (b) State and prove Baye's theorem. Ina bolt factory machines A, B and C manufactures 20%, 30% and 50% respectively of the total. Of their total output, 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that it is found to be manufactures by machines A, B and C.

11. (a) Define continuous random variable and probability density function
   If 'x' has its probability density function as

$$f(x) = \begin{cases} ax; 0 \le x \le 1 \\ a; 1 \le x \le 2 \\ 3a - ax; 2 \le x \le 3 \\ 0; other wise \end{cases}$$

   Determine the constant 'a' and compute the $P(0.5 \le x \le 2.5)$

(OR)

   (b) The joint p.d.f of two dimensional random variable (x, y) is given by

$$f(x, y) = \begin{cases} kx^2 y; 0 < x < 1; 0 < y < 1 \\ 0; other wise \end{cases}$$

   i) Find the value of 'k'   ii) Find the marginal densities of x and y
   iii) Find the mean of x

12. (a) Define m.g.f and c.g.f of a random variable. What is the effect of change of origin and scale on m.g.f and c.g.f.

(OR)

   (b) State and prove Chebyshev's inequality and write its applications.

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Section-A

I. Answer any EIGHT of the following questions   (8x4=32 Marks)

1. Explain the Primary and Secondary data
2. Define mode and explain its merits
3. Define kurtosis and explain its types
4. Define Random Experiment with an example
5. If A and B are independents then show that A and B^C are independent
6. State the baye's theorem and explain its application
7. Define a Random variable and explain its properties
8. Define independence of random variables
9. State the properties of Bivariate distribution function
10. Show that $E(XY) = E(X) E(Y)$ assuming that the random variables are discrete.
11. Define MGF and state its assumptions
12. If $\mu_1^1 = 4$, $\mu_2 = 6$ and $\mu_3 = 9$ then find the first four cumulants.

Section-B

II. Answer the following questions   (4x12=48 Marks)

13. (a) Explain the various measures of central tendencies in detail

(OR)

(b) Define moment and explain the relation between raw moments in terms of central moments

14. (a) State and prove the Addition theorem of probability for 'n' events.

(OR)

(b) State and prove Boole's inequality

15 (a) Let f(x)= ½, -1<x<1

         0, elsewhere

Be the p.d. f of the random variable x. Find distribution function and the p.d.f of $Y=X^2$

(OR)

(b) Define joint, marginal and conditional distribution functions of Bivariate random variables.

16. (a) State and prove the Cauchy-Schwartz inequality and write its application

(OR)

(b) State and prove the Chebyshev's inequality

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