

- Note :**
1. All questions are Compulsory.
  2. All questions carry equal marks.
  3. Figures to the right indicate marks assigned to each sub-question.

**Q.1 a.** If  $P(A \cup B) = \frac{19}{24}$ ,  $P(A) = \frac{3}{8}$ ,  $P(A \cap B) = \frac{1}{4}$ . Find  $P(B)$ . (1)

OR

**Q.1 a.** A card is drawn at random from a full pack of 52 well shuffled playing cards. What is the probability that it is a King card. (1)

**Q.1 b. Attempt any two questions out of three from the following.**

1. State and prove Multiplication Theorem on probability. Also state the theorem if A and B are independent events. (7)
2. One lottery ticket is drawn at random from a set of 40 tickets numbered from 1 to 40. What is the probability that the number on the ticket drawn is a:
  - p. A perfect square
  - q. An Odd number
  - r. Multiple of 2 & 3
  - s. Divisible by 5 or 7
3. A sample survey was undertaken to investigate which papers (A, B & C) people read. In a sample of 100 people, following results were obtained.

60 read A, 40 read B, 70 read C

32 read A & B, 45 read A & C

38 read B & C, 30 read A, B & C.

If a person is selected at random from this sample, determine the probability that:

- p. He reads only newspaper A.
- q. He reads at least one newspaper.
- r. He does not read any newspaper.

**Q.2 a.** Define "Discrete random variable." (1)

OR

**a.** If  $p(x)$  in the following case is a probability distribution function then find the value of K. (1)

x	-1	0	1
p(x)	$\frac{K+1}{12}$	$\frac{1}{12}$	$\frac{K}{12}$

**Q.2 b. Attempt any two questions out of three from the following:**

1. State & prove the properties of expectation of a discrete random variable  $x$ . (7)
2. Following is the joint probability distribution of  $x$  &  $y$ .

$$p(x,y) = \frac{x+y}{36}, \quad x = 1, 2, 3 \text{ \& } y = 1, 2, 3.$$

$$= 0 \quad \text{otherwise}$$

Calculate COV ( $x, y$ ). (7)

3. Define the following terms:

- p. Raw moments
- q. Central moments
- r. Skewness
- s. Kurtosis

- Q.3 a.** If  $x$  is a binomial variate with parameters  $n = 6$  &  $p = 1/2$ . Write the probability distribution of  $x$ . (1)

OR

- Q.3 a.** For a Poisson variate with mean = 9. What is the value of Standard deviation? (1)

**b. Attempt any two questions out of three.**

1. A has won 20 out of 30 games of Chess with B. In a new series of 6 games, What is the probability that A would win.

- p. only four games
- q. Four or more games
- r. none of the game

2. Write the probability distribution function of Poisson distribution. Obtain its mean & variance. (7)

3. A fair die is thrown with six numbers on its faces. Let the random variable ' $x$ ' takes values on the uppermost face of the die. Find the probability distribution of  $x$ , Also find  $E(x)$  & variable of  $x$ . (7)

- Q.4 a.** Define "Joint probability distribution function." (1)

OR

- Q.4 a.** Define "Cumulative probability distribution function of  $x$ ." (1)

**b. Attempt any two questions out of three.**

1. State & Explain Baye's Theorem. (7)
2. Given the joint probability distribution function of  $x$  &  $y$ .

$x \backslash y$	-1	0	1
1	0.05	0.10	0.05

**Find**

- p. Marginal Probability distribution function of  $x$  &  $y$ .  
 q. Conditional Probability distribution of  $x$  given  $y \geq 0$ .  
 r. Find  $E(x)$  &  $V(x)$ . (7)
3. In a factory bolts are packed in boxes of 500 each. It is known that on an average 0.1% of the bolts are defective. What is the chance that one such box consists of - (7)
- p. No defective.  
 q. One defective.  
 r. two or more defective.

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Attempt any two questions out of three from the following.

- State and prove Multiplication Theorem on probability. Also state the theorem if  $A$  and  $B$  are independent events. (7)
- One lottery ticket is drawn at random from a set of 40 tickets numbered from 1 to 40. What is the probability that the number on the ticket drawn is a:
  - A perfect square
  - An Odd number
  - Multiple of 2 & 3
  - Divisible by 5 or 7
- A sample survey was undertaken to investigate which papers (A, B & C) people read. In a sample of 100 people, following results were obtained.  
 60 read A, 40 read B, 70 read C  
 20 read A & B, 30 read A & C  
 30 read B & C, 10 read A, B & C  
 If a person is selected at random from this sample, determine the probability that:
  - He reads only newspaper A. (1)
  - He reads at least one newspaper. (7)
  - He does not read any newspaper. (1)

Q.2 a. Define Discrete random variable. (1)

OR

- a. If  $p(x)$  in the following case is a probability distribution function then find the value of  $K$ . (1)

$x$	-1	0	1
$p(x)$	$\frac{K}{2}$	$\frac{K}{3}$	$\frac{K}{6}$