PROBABILITY

MEAN & VARIANCE OF A RANDOM VARIABLE

EXERCISE

(FOR COMPETITIVE EXAM)

- Q.1 Two T-shirts are successively drawn at random without replacement from a drawer containing 5 red T-shirts and 8 white T-shirts. Calculate the probabilities for all possible outcomes.
 (a) 1 (b) 13 (c) 40 (d) 346
- **Q.2** A jar of pickles is randomly selected using an automated filling process, where each jar is filled with 2.5 kg of pickles. However, due to some issues in the automated process, the weight of a jar may vary within the range of 1.7 kg to 2.9 kg, excluding the latter. Let X represent the weight of the selected jar of pickles. Determine the range of X.

(a) $3.7 \le X < 3.9$	(b) $1.6 \le X < 3.2$
(c) $1.7 \le X < 2.9$	(d) $1 \le X < 5$

Q.3 The representation for the probability density function of the continuous random variable X is denoted as _____.

(a) $\int f(x)dx = \infty$, $-1 \le x \le 1$ (b) $\int f(x)dx = 1$, $-\infty \le x \le \infty$

(c) $\int f(x)dx = 0$, $-\infty < =x < =\infty$

(d) $\int f(x+2)dx = .5, -\infty <=x <=\infty$

- Q.4 Let X represent the number of heads in three coin tosses. Calculate the mean and variance for the random variable X.(a) 4.8 (b) 6 (c) 3.2 (d) 1.5
- Q.5 A football player successfully makes 75% of his 5-point shots and 25% of his 7-point shots. Calculate the expected value for a 7-point shot by the player.
 (a) 4.59 (b) 12.35 (c) 5.25 (d) 42.8
- Q.6 In a card game, Reena earns 3 Rs. for drawing either a king or a spade, and 7 Rs. for drawing either a heart or a queen from a standard deck of 52 playing cards. To make the game fair, what should be the amount she pays each time to lose the game?
 (a) 15 (b)6 (c) 23 (d) 2

CLASS 12

Q.7 A random variable X has only two possible values, 4 and 5, with probabilities

P(4) = 0.32 and P(5) = 0.47, respectively. Calculate the variance of X. (a) 8.21 (b) 12 (c) 3.7 (d) 4.8

Q.8 A 6-sided die exhibits bias, where the numbers one to four have equal probabilities, while five and six are three times as likely to appear. If X represents the number on the uppermost face, calculate the expected value of X given that six is shown on the uppermost face.

(a)
$$\frac{13}{4}$$
 (b) $\frac{3}{5}$ (c) $\frac{2}{7}$ (d) $\frac{21}{87}$

Q.9 Throwing a fair cubical die twice and summing up the scores is considered an event. Determine the expected value of the event involving the sum of the scores on the upper sides of the die in two consecutive throws.

Q.10 A random variable X can assume only two values, 2 and 4, with probabilities

P(2) = 0.45 and P(4) = 0.97, respectively. Calculate the expected value of X.

(a) 3.8 ((b) 2.9	(c) 4.78	(d) 5.32
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ANSWER KEY

- **1.** (a)
- **2.** (c)
- **3.** (b)
- **4.** (d)
- **5.** (c)
- **6.** (d)
- **7.** (c)
- **8.** (a)
- **9.** (c)
- **10.** (c)