PRACTICE PAPER 01 (2026-27)
CHAPTER 13 : PROBABILITY

SUBJECT: MATHEMATICS	**MAX. MARKS:** 40
CLASS: XII	**DURATION:** 1½ hrs

General Instructions:

(i) All questions are compulsory.

(ii) This question paper contains 20 questions divided into five Sections A, B, C, D and E.

(iii) Section A comprises 10 MCQs of 1 mark each (Q9 and Q10 are Assertion–Reason questions). Section B comprises 4 questions of 2 marks each. Section C comprises 3 questions of 3 marks each. Section D comprises 1 question of 5 marks with an internal choice. Section E comprises 2 case study based questions of 4 marks each, with internal choice in the last sub-part.

(iv) There is no overall choice. Internal choices have been provided where indicated.

(v) Use of calculators is not permitted.

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. If P(A) = 0.6, P(B) = 0.3 and P(A ∩ B) = 0.2, then P(A | B) is equal to

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{5}$

2. If A and B are independent events with P(A) = $\frac{1}{3}$ and P(B) = $\frac{1}{4}$, then P(A ∪ B) is

(a) $\frac{7}{12}$ (b) $\frac{1}{12}$ (c) $\frac{1}{2}$ (d) $\frac{5}{12}$

3. Two fair coins are tossed. The probability that both show heads, given that at least one shows a head, is

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{2}{3}$

4. A fair coin is tossed 5 times. The probability of getting exactly 2 heads is

(a) $\frac{1}{32}$ (b) $\frac{1}{16}$ (c) $\frac{5}{32}$ (d) $\frac{5}{16}$

5. A random variable X takes the values 1, 2, 3 with probabilities k, 2k and 3k respectively. The mean E(X) is

(a) $\frac{1}{6}$ (b) $\frac{7}{3}$

(c) 2 (d) $\frac{14}{3}$

6. The variance of a binomial distribution with n = 10 and p = 0.3 is

(a) 3 (b) 0.21

(c) 2.1 (d) 7

7. If P(A) = 0.4 and P(B | A) = 0.5, then P(A ∩ B) is

(a) 0.9 (b) 0.8

(c) 0.1 (d) 0.2

8. If P(B) ≠ 0, then P(A | B) + P(A′ | B) is equal to

(a) 0 (b) 1

(c) P(A) (d) P(B)

For Q9 and Q10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

9. Assertion (A): Two mutually exclusive events A and B with $P(A) > 0$ and $P(B) > 0$ cannot be independent.

Reason (R): Events A and B are independent if and only if $P(A \cap B) = P(A) \cdot P(B)$.

10. Assertion (A): If A and B are independent events with $P(A) = 0.3$ and $P(B) = 0.4$, then $P(A \cup B) = 0.7$.

Reason (R): For independent events A and B, $P(A \cap B) = P(A) \cdot P(B)$.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. A die is thrown twice. Find the probability that the sum of the numbers is 8, given that the two numbers are equal.

12. If $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cup B) = 0.7$, find $P(A \cap B)$. Are A and B independent? Justify.

13. A random variable X has the probability distribution $P(X = x) = kx$ for $x = 1, 2, 3, 4$. Find k and the mean E(X).

14. A fair die is thrown 4 times. Find the probability of getting a six exactly once.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. A bag contains 5 red and 3 blue balls. Two balls are drawn one after the other without replacement. Find the probability that the two balls are of different colours.

16. Bag I contains 3 red and 4 black balls and Bag II contains 5 red and 6 black balls. One bag is chosen at random and a ball is drawn from it. If the ball drawn is red, find the probability that it came from Bag II.

17. Two cards are drawn one after the other with replacement from a well-shuffled pack of 52 cards. Let X be the number of kings obtained. Find the probability distribution of X and its mean.

SECTION – D

Question 18 carries 5 marks.

18. In a factory, machines A, B and C produce 25%, 35% and 40% of the items, and 5%, 4% and 2% of their respective outputs are defective. An item is chosen at random and found to be defective. Find the probability that it was produced by machine B.

OR

A biased coin has probability $\frac{3}{4}$ of showing a head. It is tossed 5 times. Find the probability of getting at least 4 heads.

SECTION – E (Case Study Based Questions)

Questions 19 and 20 carry 4 marks each.

19. In a town, 2% of the people have a certain disease. A screening test gives a positive result for 95% of people who have the disease, and also (wrongly) for 4% of people who do not have it. A person is chosen at random and tested. Let D be the event 'the person has the disease' and T the event 'the test is positive'.

Based on the above information, answer the following questions:

(i) Write the values of P(D), P(T | D) and P(T | D′). (1)

(ii) Find P(T). (1)

(iii) If the test is positive, find the probability that the person actually has the disease. (2)

OR

(iii) If the test is negative, find the probability that the person has the disease. (2)

20. A basketball player scores a free throw with probability 0.7 each time, independently of other throws. She takes 4 free throws. Let X be the number of successful throws.

Based on the above information, answer the following questions:

(i) Name the distribution followed by X and write the values of n, p and q. (1)

(ii) Find P(X = 2). (1)

(iii) Find the probability that she scores at least 3 times. (2)

OR

(iii) Find the mean and variance of X. (2)

— End of Question Paper —