Short Answer Type Questions – II

[3 marks]

Que 1. Harpreet tosses two different coins simultaneously (say, one is of ₹ 1 and other of ₹ 2). What is the probability that she gets at least one head?

Sol. When two coins are tossed simultaneously, the possible outcomes are (H, H), (H, T), (T, H), (T, T), which are all equally likely. Here (H, H) means head up on the first coin (say on ₹ 1) and head up on the second coin (₹ 2). Similarly (H, T) means head up on the first coin and tail up on the second coin and so on.
The outcomes favourable to the event E,' at least one head' are (H, H), (H, T) and (T, H).
So, the number of outcomes favourable to E is 3.

Therefore, P (E) = $\frac{3}{4}$

i.e., the probability that Harpreet gets at least one head is $\frac{3}{4}$.

Que 2. A game consists of tossing a one rupee coin 3 times and nothing its outcomes each time. Hanif wins if all the tosses give the same result, i.e., three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

Sol. The outcomes associated with this experiment are given by
HHH, HHT, HTH, THH, TTH, THT, HTT, TTT
∴ Total number of possible outcomes = 8
Now, Hanif will lose the game if he gets
HHT, HTH, THH, TTH, THT, HTT
∴ Favourable number of events = 6
∴ Probability that he lose the game = $\frac{6}{8} = \frac{3}{4}$

Que 3. Three unbiased coins are tossed together. Find the probability of getting:

(i) all heads. **(ii) exactly two heads.**
(iii) exactly one head. **(iv) at least two heads.**
(v) at least two tails

Sol. Elementary events associated to random experiment of tossing three coins are
HHH, HHT, HTH, THH, HTT, THT, TTH, TTT
∴ Total number of elementary events = 8.
(i) The event "getting all heads" is said to occur, if the elementary event HHH occurs, i.e., HHH is an outcomes.

$\therefore$ Favourable number of elementary events = 1

Hence, required probability = $\frac{1}{8}$

(ii) The event "getting two heads" will occur, if one of the elementary events HHT, THH, HTH occurs.
$\therefore$ Favourable number of elementary events = 3

Hence, required probability = $\frac{3}{8}$

(iii) The event of "getting one head". When three coins are tossed together, occur if one of the elementary events HTT, THT, TTH, occurs.
$\therefore$ Favourable number of elementary events = 3

Hence, requited probability = $\frac{3}{8}$.

(iv) If any of the elementary events HHH, HHT, HTH and THH is a outcomes, then we say that the event "getting at least two heads" occurs.
$\therefore$ Favourable number of elementary events = 4

Hence, required probability = $\frac{4}{8} = \frac{1}{2}$.

(v) Similar as (iv) P (getting at least two tails) = $\frac{4}{8} = \frac{1}{2}$

Que 4. A die is thrown once. Find the probability of getting:
(i) a prime number. **(ii) a number lying between 2 and 6.**
(iii) an odd number.

Sol. We have, the total number of possible outcomes associated with the random experiment of throwing a die is 6 (i.e., 1, 2, 3, 4, 5, 6).
(i) Let E denotes the event of getting a prime number.
So, favourable number of outcomes = 3 (i.e., 2, 3, 5)

$\therefore$ $P\ (E) = \frac{3}{6} = \frac{1}{2}$

(ii) Let E be the event of getting a number lying between 2 and 6.
$\therefore$ Favourable number of elementary events (outcomes) = 3 (i.e., 3, 4, 5)

$\therefore$ $P(E) = \frac{3}{6} = \frac{1}{2}$

(iii) Let be the event of getting an odd number.
$\therefore$ Favourable number of elementary events = (i.e., 1, 3, 5)

$\therefore$ P (E) = $\frac{3}{6} = \frac{1}{2}$

Que 5. Suppose we throw a die once. (i) What is the probability of getting a number greater that 4?

Sol. (i) Here, let E be the event 'getting a number greater than 4'. The number of possible outcomes are six: 1, 2, 3, 4, 5 and 6, and the outcomes favourable to E. are 5 and 6. Therefore, the number of outcomes favourable to E is 2. So,

P (E) = P (number greater than 4) = $\frac{2}{6} = \frac{1}{3}$

(ii) Let F be the event 'getting a number less than or equal to 4'.
Number of possible outcomes = 6
outcomes favourable to the event F are 1, 2, 3, 4.
So, the number of outcomes favourable to F is 4.

Therefore, P (F) = $\frac{4}{6} = \frac{2}{3}$

Que 6. One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will:
(i) be an ace. (ii) not be an ace.

Sol. Well-shuffling ensures equally likely outcomes.
(i) There are 4 aces in a deck. Let E be the event 'the card is an ace'.
The number of outcomes favourable to E = 4.
The number of possible outcomes = 52

Therefore, P (E) = $\frac{4}{52} = \frac{1}{13}$.

(ii) Let $\overline{E}$ be the event 'card drawn is not an ace'.
The number of outcomes favourable to the event $\overline{E}$ = 52 – 4 = 48.
The number of possible outcomes = 52.

Therefore, P $\overline{E}$ = $\frac{48}{52} = \frac{12}{13}$.

Que 7. Five cards – the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random.
(i) What is the probability that the card is the queen?
(ii) If the queen is drawn and put aside, what is the probability that the second card picked up is (a) an ace? (b) a queen?

Sol. Here, the total number of possible outcomes = 5.
(i) Since, there is only one queen
∴ Favourable number of elementary events = 1
∴ Probability of getting the card of queen = $\frac{1}{5}$.

(ii) Now, the total number of possible outcomes = 4.

(a) Since, there is only one ace

∴ Favourable number of elementary events = 1

∴ Probability of getting an ace card = $\frac{1}{4}$.

(b) Since, there is on queen (as queen is put aside)

∴ Favourable number of elementary events = 0

∴ Probability of getting a queen = $\frac{0}{4} = 0$.

Que 8. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be (i) red? (ii) white? (iii) not green?

Sol. Here, total number of marbles = 17.

∴ Total number of possible outcomes = 17.

(i) Since, there are 5 red marbles in the box.

∴ Favourable number of elementary events = 5

∴ Probability of getting red marble = $\frac{5}{17}$

(ii) Since, there are 8 white marbles in the box.

∴ Favourable number of elementary events = 8

∴ Probability of getting white marble = $\frac{8}{17}$

(iii) Since, there are 5 + 8 = 13 marbles which are not green in the box.

∴ Favourable number of elementary events = 13

∴ Probability of not getting a green marble = $\frac{13}{17}$