1. PROBABILITY

Probability is a concept which numerically measures the degree of certainty of the occurrence of events.

1.1 EXPERIMENT

An operation which can produce some well-defined outcomes is called an experiment.

(I) Tossing a coin. When we throw a coin, either a head (H) or a tail (T) appears on the upper face.

(II) Throwing a die. A die is a solid cube, having 6 faces, marked 1, 2, 3, 4, 5 and 6, or having 1, 2, 3, 4, 5 and 6 dots.

(III) A deck of playing cards has in all 52 cards.

(i) It has 13 cards each of four suits, namely Spades, clubs, hearts and diamonds.

(a) Cards of spades and clubs are black cards.

(b) Cards of hearts and diamonds are red cards.

(ii) Kings, queens and jacks are known as face cards.

1.2 EVENT

The collection of all or some of the possible outcomes is called an event.

Examples:

(i) In throwing a coin, H is the event of getting a head.

(ii) Suppose we throw two coins simultaneously and let E be the event of getting at least one head. Then, E contains *HT, TH, HH*.

1.3 EQUALLY LIKELY EVENTS

A given number of events are said to be equally likely if none of them is expected to occur in preference to the others.

2. PROBABILITY OF OCCURRENCE OF AN EVENT

Probability of occurrence of an event E, denoted by $P(E)$ is defined as:

$$P(E) = \frac{\text{Number of outcomes favourable to } E}{\text{Total number of possible outcomes}}$$

2.1 COMPLEMENTARY EVENT

Let E be an event and (not E) be an event which occurs only when E does not occur.

The event (not E) is called the complementary event of E.

Clearly, $P(E) + P(\text{not } E) = 1$.

$\therefore$ $P(E) = 1 - P(\text{not } E)$.

3. SOME SPECIAL SAMPLE SPACES

A die is thrown once	$S = \{1,2,3,4,5,6\}; n(S) = 6$
A coin is tossed once	$S = \{H, T\}; n(S) = 2$

A coin is tossed twice
or
Two coins are tossed simultaneously

$$S = \{HH, HT, TH, TT\};\ n(S) = 4 = 2^2$$

A coin is tossed three times
or
Three coins are tossed simultaneously

$$S = \begin{Bmatrix} HHH, HHT, HTH, THH \\ TTT, TTH, THT, HTT \end{Bmatrix};\ n(S) = 8 = 2^3$$

Two dice are thrown together
or
A die is thrown twice

$$S = \begin{Bmatrix} (1,1),(1,2),(1,3),(1,4),(1,5),(1,6) \\ (2,1),(2,2),(2,3),(2,4),(2,5),(2,6) \\ (3,1),(3,2),(3,3),(3,4),(3,5),(3,6) \\ (4,1),(4,2),(4,3),(4,4),(4,5),(4,6) \\ (5,1),(5,2),(5,3),(5,4),(5,5),(5,6) \\ (6,1),(6,2),(6,3),(6,4),(6,5),(6,6) \end{Bmatrix}$$

$$n(S) = 6^2$$