Ch-14 Probability

Important Terms

1. **Probability –** it is a concept, which numerically measures the degree of certainty of the occurrence of events.
2. **Experiment –** an operation which can produce some well-defined outcomes.
3. **Event –** the collection of all or some of the possible outcomes.
4. **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.

Probability of Occurrence of an Event (E)

1. $P(E) = \frac{\text{Number of outcomes favourable to E}}{\text{Total number of possible outcomes}}$.
2. **Complementary events –** Let E be an event and E'(not E) be an event which occurs only when E does not occur. The event E' is called the complementary event of E.

   Clearly, $P(E) + P(E') = 1$

   $P(E) = 1 - P(E')$

   $0 \leq p(E) \leq 1$

   Sum of the probabilities of all the outcomes of random experiment is 1.

Some Special Sample Spaces

1. A die is thrown once –
   a. $S = \{1, 2, 3, 4, 5, 6\}$, $n(S) = 6$.
2. 2 dice are thrown together –
   a. $S = \begin{Bmatrix} (1,1),(1,2),(1,3),(1,4),(1,5),(1,6), \\ (2,1),(2,2),(2,3),(2,4),(2,5),(2,6), \\ (3,1),(3,2),(3,3),(3,4),(3,5),(3,6), \\ (4,1),(4,2),(4,3),(4,4),(4,5),(4,6), \\ (5,1),(5,2),(5,3),(5,4),(5,5),(5,6), \\ (6,1),(6,2),(6,3),(6,4),(6,5),(6,6) \end{Bmatrix}$, $n(S) = 6^2 = 36$.
3. A coin is tossed once –
   a. $S = \{H, T\}$, $n(S) = 2$.
4. A coin is tossed twice OR 2 coins are tossed simultaneously –
   a. $S = \{HH, HT, TH, TT\}$, $n(S) = 2^2 = 4$.
5. A coin is tossed 3 times OR 3 coins are tossed simultaneously –
   a. $S = \{HHH, HHT, HTH, THH, TTH, THT, HTT, TTT\}$, $n(S) = 2^3 = 8$.