Subject code: - BSC-201 (IInd Semester) CSE (A1)

Note:- A playing card contains 52 cards. ①

out of which there are four colours,

viz. Spade, club, diamond and Heart.

There are 26 red cards and 26 black cards.

There are 13 cards of spade
13 cards of club
13 cards of Diamond
13 cards of Heart.

There are four kings
four Queens
four Jackels or Jacks
four Aces.

There is only one king of spade
one king of club
one king of Diamond
one king of Heart

There is only one queen of spade
one queen of club
one queen of Diamond
one queen of Heart.

There is only one ace of spade
one ace of club
one ace of Diamond
one ace of Heart

②

Total no of Face cards = 16
(4 ~~Spade~~ kings + 4 ~~club~~ Queens + 4 Jackels + 4 Aces)

Experiment 1: In a toss of one coin,
No. of Head = one
No. of Tail = one
∴ Sample space = {H, T}

Experiment 2: - In a toss of 2 coins,
Sample space = {HT, TH, HH, TT}
Total no. of outcomes or
Total no of cases = $4 = 2^2$.

Experiment 3: In a toss of 3 coins,
Sample space = {HHH, HHT, HTH, HTT, THH, TTH, THT, TTT}
Total no. of outcomes = $8 = 2^3$.

Experiment 4: Similarly in a toss of 4 coins
total no of outcomes or total no. of cases will be $= 16 = 2^4$.

Remark: In a toss of n coins, then total no. of cases $= 2^n$.

Experiment 1: In a throw of 1 die,

Total no. of cases $= 6 = 6^1$

Sample space $= \{1, 2, 3, 4, 5, 6\}$

Experiment 2: In a throw of 2 die,

$$\text{Sample space} = \{ (1,1), (1,2), (1,3), \text{——} (1,6)$$
$$(2,1), (2,2), (2,3), \text{——} (2,6)$$
$$(3,1), (3,2), (3,3), \text{——} (3,6)$$
$$(4,1), (4,2), (4,3), \text{——} (4,6)$$
$$(5,1), (5,2), (5,3), \text{——} (5,6)$$
$$(6,1), (6,2), (6,3), \text{——} (6,6) \}$$

Total no. of outcomes $= 36 = 6^2$

Similarly in a throw of 3 die,

the total no. of outcomes will be $= 6^3 = 216$

Remark: In a throw of n die, then

total no. of outcomes will be

$= 6^n$.

If n-1 die are thrown then the

total no. of outcomes will be $= 6^{n-1}$

Event: The possible outcomes of a trial are called events.

Equally likely events: The events are said to be equally likely if there is no reason to expect any one in preference to any other.

Exhaustive events: It is the total no. of all possible outcomes of any trial.

Mutually Exclusive events: Two or more events are said to be mutually exclusive if they cannot happen simultaneously in a trial.

Favourable events: The cases which ensure the occurrence of the events are called favourable.

Sample Space: The set of all possible outcomes of an experiment is called a sample space.

Probability of occurrences of event A, denoted by P(A), is defined as

$$P(A) = \frac{\text{No. of favourable cases}}{\text{No. of exhaustive cases}} = \frac{n(A)}{n(S)}$$

Theorems: In a random experiment, if S be a sample space and A is an event, then

i) $P(A) \geq 0$

(ii) $P(\phi) = 0$,

(iii) $P(S) = 1$

ii). If A and B are mutually exclusive events, then $P(A \cap B) = 0$

iii). If A and B are two mutually exclusive events, then $P(A) + P(B) = 1$

iv). If A and B are mutually exclusive events, then $P(A \cup B) = P(A) + P(B)$.

V). For any two events A and B,

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

(vi). For each event A, $P(\bar{A}) = 1 - P(A)$ where $\bar{A}$ is the complementary event.

(vii). $0 \leq P(A) \leq 1$.

Compound Event: The simultaneous happening of

i) two or more events is called a compound event if they occur in connection with each other.

ii) Conditional Probability:- Let A and B be two events associated with the sample space, then

$$P(A|B) = \frac{P(A \cap B)}{P(B)} \text{ and } P(B|A) = \frac{P(A \cap B)}{P(A)}$$