

Chapter 13

PROBABILITY

SOME DEFINITIONS:

Experiment:

An operation which results in some well defined outcomes is called Experiment.

Random Experiment:

An experiment whose outcome cannot be predicted with certainty is called a Random Experiment.

NOTE:

An experiment whose outcome can be told before is not a Random experiment.

Example:

If today is Monday, tomorrow has to be Tuesday. It is certain so it is not Random Experiment.

- a) "Tossing a fair coin" can result in head or tail, is Random Experiment.
- b) "Throwing an unbiased die" can result in any number from 1 to 6, is Random Experiment.

Sample Space:(Total Outcome)

The set of all possible outcomes of a random experiment is called the sample space for that experiment. It is usually denoted by 'S'.

Example:

Tossing of a coin once will result either in head(H) or in tail(T). So sample space will be $S = \{H, T\}$.

Event:

A subset of the sample space associated with a random experiment is called an **Event**.

Example:

When a dice is thrown, sample space is $S = \{1, 2, 3, 4, 5, 6\}$.

Now 'A' is the event of occurrence of an odd number. So

$A = \{1, 3, 5\}$, 'B' is the occurrence of a number greater than

'4' so $B = \{5, 6\}$. 'C' is the event of occurrence of prime

number $C = \{2, 3, 5\}$.

Simple Event (Elementary event):

If an event E has only one element of a sample space.

Example:

When a coin is tossed, sample space $S = \{H, T\}$.

Let A be the event of occurrence of tail, So $A = \{T\}$

Or B be the event of occurrence of head, So $B = \{H\}$.

So A and B contains just one element, so both are simple event.

Mixed Event (or) Compound Event or Composite**Event:**

A subset of the sample space S which contains more than one element is called a Mixed Events.

Example:

Tossing of a coin twice so $S = \{(H, T), (T, H), (H, H), (T, T)\}$

E_1 : Event of getting exactly one head: $(H, T), (T, H)$

E_1 : Contains two elements, so E_1 is a mixed event or compound event.

Complementary Event:

For every event 'A', there corresponds another event 'A' called the complementary event to 'A'. It is called the event 'not A'. Take experiment of throwing a die once, then $S = \{1, 2, 3, 4, 5, 6\}$.

Let 'A' be the event of getting event number in the outcome, so $A = \{2, 4, 6\}$. Then 'not A' or $A^1 = \{1, 3, 5\}$.

When the sets A and B are two events associated with a sample space, then ' $A \cup B$ ' is the event 'Either A or B or both'. This event called ' $A \cup B$ ' is called 'A or B'.

If A and B are two events, then the set $A \cap B$ denotes the event 'A and B'.

The set $A - B$ may denote the event 'A but not B' we know that $A - B = A - (A \cap B)$.

