Probability Theory

Basic Terminology :—

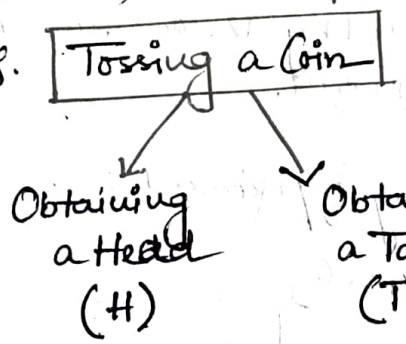
① **Experiment** → An experiment is an act which can be repeated under identical conditions. It results in some outcomes.

② **Random Experiment** → Random experiments are those experiments, whose results are determined by chance.
eg. tossing a coin, rolling a dice etc.

NOTE: An experiment is called Random, if the set of all possible outcomes is known but the exact outcomes can not be predicted with certainty, without performing the experiment.

NOTE: Each and every possible ~~out~~ results of a random experiment, is referred to an outcome.

eg. Tossing a Coin



In Probability and Statistics, experiment means Random Experiment

NOTE: Random does not mean haphazard, it means Something related to chances

NOTE: A particular performance of an experiment, is called a Trial.

③ **Event** → Any outcomes of an event, is called an event. An event is said to be elementary or simple, if it is not possible to decompose the event into simpler events, composite otherwise.

NOTE: Each time when an experiment is performed, one and only one elementary event will occure.

NOTE: A composite event is composed of two or more elementary events.

NOTE: An event is a collection of one or more elementary events, characterized by some common descriptive features and it is usually denoted by capital letters.

NOTE: An event A occurs, when any one of the elementary events in A occurs. Thus, a set of elementary events are said to be favourable to an event A, if occurrence of any one of them implies the occurrence of A.

NOTE: The elementary events in relation to a given experiment, are said to be equally likely if each of them, is as likely to occur as any other.

(4) Sample Space → A sample space (or sample description space) is a collection of all possible distinct outcomes of a random experiment.
It is commonly denoted by Ω or S and it is also known as sure (or certain) event.

Eg. For a die throwing experiment —.

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

For tossing a single coin —.

$$S = \{H, T\}$$

NOTE: An event is a subset of a sample space.

NOTE: Sample Points are the elements in a Sample Space.

NOTE: Each distinct outcome in a sample space, is an elementary event, which is also known as an element of the sample space.

NOTE: A sample space is said to be discrete if it consists of a finite or a countably infinite number of elements.

NOTE: A sample space is continuous if it includes all the numbers in some interval of the real line.

eg. In a die-throwing experiment, the discrete (finite) sample space is —

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

eg. If the observe time (t) to failure of CRT (which is put on test), then the continuous sample space would be —

$$S = \{t_i : t \geq 0\}$$

(5) Impossible Event → The event which contains no elementary event at all, is known as an impossible event and it is denoted by ϕ. (null event)

eg. In a die-throwing experiment, the event — "obtaining an irrational no." is an impossible event.

(6) Mutually Exclusive Events → Two or more events are said to be mutualy exclusive (or disjoint) when no two of them can occure simultaneously. They can not have any elementary event in common.