

Introduction to uncertainty (Basic Concepts in probability)

Experiment :-

The process of making an observation or measurement about a phenomenon is known as an Experiment.

eg: ① Sitting in the balcony of the house and watching the movement of clouds in the sky is an experiment.

② For given Values of Pressure (P), measuring the corresponding Values of Volume (V) of a gas is

$$P \cdot V = k \text{ (const)}$$

Deterministic experiment :-

If an experiment produces the same result when it is conducted several times under identical condition, then the experiment is known as determinant experiment

eg: All the experiments in physical and engineering experiments.

Random Experiment :-

If an experiment produce different result even though it is conducted several times under identical conditions, then the experiment is known as **Random Experiment**

eg: All the experiments in social sciences are random.

Trail :- Conducting a random experiment once is known as Trail

Outcome :- A result of the random experiment in a trail is known as outcome.

Note :- Outcomes denoted by lower case letters
 a, b, c, d, \dots

Sample Space :- The set of all possible outcomes of a random experiment is known as **Sample Space** and denoted by S .

Event :- A subset of the Sample Space is known as event. The events are denoted by upper case letters A, B, C etc.

Impossible Event:- An event with no outcome for it is known as impossible event and denoted by \emptyset

Certain or Sure Event:- An event consisting of all possible outcomes of a random experiment is known as Certain or Sure event. and it is same as the sample space.

Exhaustive events:- The events in a sample space are said to be exhaustive if their union is equal to the sample space.

The events A_1, A_2, \dots, A_n in S are said to be exhaustive if $\bigcup_{i=1}^n A_i = S$.

Mutually Exclusive Events:-

Two or more events in a sample space are said to be mutually exclusive if the happening of one of them precludes the happening of other.

Mathematically two events A and B in sample space S are said to be mutually exclusive if $A \cap B = \emptyset$.

PROBABILITY

If an experiment is performed n is the no. of exhaustive and m is the no. of favourable cases of an event A . Then the probability of an event A is defined as

$$\frac{\text{no. of favourable case}}{\text{no. of exhaustive cases}} = \frac{m}{n}$$
$$= \frac{n(A)}{n(S)}$$

Where $n(A)$ = no. of elements belonging to A

$n(S)$ = no. of elements belonging to S (sample space)

