Complete

MATH

IIT-JEE · CBSE eBOOKS

CLASS 11&12th

CLASS 12th

Probability

01. Addition Theorem

Independent Events *Two eventa A and B associated to a random experiment are independent if the probability of occurrence or non occurrence of A is not affected by the occurrence or non-occurrence of B.*

Three or more events are independent if the probability of occurrence or non-occurrence of any one of them is not affected by the occurrence or non-occurrence of others.

NOTE ☞ *Events associated to independent random experiments are always independent.*

Conditional Probability

Let A and B be two events associated with a random experiment. Then, the probability of occurrence of event A under the condition that B has already occurred and $P(B) \neq 0$, is called the conditional probability and it is denoted by $P(A/B)$. Thus, we have

$P(A/B)$ = Probability of occurrence of a given that B has already occurred.

Similarly, $P(B/A)$ when $P(A) \neq 0$ is defined as the probability of occurrence of event B when A has already occurred.

$P(A/B)$ = Probability of occurrence of A when B occurs

Or

$P(A/B)$ = Probability of occurrence of A when B is taken as the sample space

Or

$P(A/B)$ = Probability of occurrence of A with respect to B.

and,

$P(A/B)$ = Probability of occurrence of B when A occurs

Or

$P(A/B)$ = Probability of occurrence of B when A is taken as the sample space.

Or

$P(A/B)$ = Probability of occurrence of B with respect to A.

Multiplication Theorems on Probability

Theorem I *If A and B are two events associated with a random experiement, then*

$$P(A \cap B) = P(A)\ P(B/A), \text{ if } P(A) \neq 0$$

or,

$$P(A \cap B) = P(B)\ P(A/B), \text{ if } P(B) \neq 0$$

NOTE ☞ *From (i) and (ii) in the above theorem, we find that*

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

Remark *If A and B are independent events, then $P(A/B) = P(A)$ and $P(B/A) = P(B)$.*

$\therefore \quad P(A \cap B) = P(A)\ P(B)$.

Also,

$$P(A \cup B) = 1 - P(\overline{A})\ P(\overline{B})$$