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MATH

IIT-JEE·CBSE **eBOOKS**

CLASS 11&12th

CLASS 11th

Mathematical Reasoning

01. Statements or Propositions

Definition *A statement or a proposition is an assertive (or a declarative) sentence which is either true of false but not both.*
A true statement is also known as a valid statement. If a statement is false, we say that it is an invalid statement.

Open Statement *A declarative sentence containing variable (s) is an open statement if. It becomes a statement when the variable (s) is (are) replaced by some definite value (s).*

Truth Set *The set of all those values of the variable (s) in an open statement for which it becomes a true statement is called the truth set of the open statement.*

Truth Value *The truth or falsity of a statement is called its truth value.*

Simple Statement *Any statement or proposition whose truth value does not explicity depend on another statement is said to be a simple statement.*

Compound Statements *If a statement is combination of two or more simple statement, then it is said to be a compound statement or a compound proposition.*

The simple statements which form a compound statement are known as its sub-statements or components or constituents.
If p, q, r, ... are sub-statements of a compound statement S, then we write the compound statement as S (p, q, r, ...).
The fundamental property of a compound statement is that its truth value is completely determined by the truth values of the sub-statements together with the way in which they are connected to form the compound statement.

Connectives *The phrases or words which connect simple statement are called <u>logical connectives</u> or <u>sentenial connectives</u> or simply <u>connectives</u> or <u>logical operators</u>.*

Connective	Symbol	Nature of the Compound statement formed by using the connective
and	$\wedge$	*conjunction*
or	$\vee$	*Disjunction*
If .... then	$\Rightarrow$ or $\rightarrow$	*Implication or conditional*
If and only if (iff)	$\Leftrightarrow$ or $\leftrightarrow$	*Equivalence or bio-conditional*
not	$\sim$ or $\neg$	*Negation*

Remark *Negation is called a connective although it does not combine two or more statements. In fact, it only modifies a statement.*