FE(CS) Batch 2014-15 **CS-211**

2. Disjunction

This uses **OR** to make compound propositions in English. However, in formal logic, the symbol (V) is used. The compound proposition is *true* when at least one participating proposition is true.

Example 1

Let.

- p: He got A in Math.
- q: He got B in English.

p V q: He got A in Math **OR** [he] got B in English.

This compound proposition is true when either of the propositions is true. Specifically, it's true even when both propositions are true.

р	q	p V q
Т	Т	Т
Т	F	Т
F	Т	Т
F	F	F

Now consider a slight variation of this example.

Example 2

Let,

 $p \oplus q$: He got A in Math OR [hel-got Dir Math. s compound proposition is the when out positions are tran. The second probability of the second pro This compound proposition is the when only one of the propositions is true. However, it cannot be true when both propositions are tra. Therefore, such a concertor had is used in situations when compound proposition cannot be true when both participating propositions are true is called *exclusive-OR* (\oplus) .

In the former case (example 1), when the compound proposition is true even when both propositions are true is called *inclusive-OR* (V).

р	q	$\mathbf{p} \oplus \mathbf{q}$
Т	Т	F
Т	F	Т
F	Т	Т
F	F	F

3. Negation

This is not a connective but a useful logical operator as it reverses the meaning of proposition. In logic, it is denoted by the symbol \neg or using a *bar* over the proposition label.

р	¬p
Т	F
F	Т

A propositional form that is always true is called a *tautology*. For example, $p \vee \neg p$.

A propositional form that is always false is called a *contradiction*. For example, $p \land \neg p$.

A proposition that is neither a tautology nor a contradiction is called a *contingency*.