# Subject:Discrete Mathematics Topic:Laws of logic

LISNA THOMAS ACADEMIC YEAR:2020-21

## LAWS OF LOGIC



#### **IDENTITY LAW**

 $\mathsf{PVT} \equiv \mathsf{T}$ 

 $P^T \equiv P$ 

 $PVF \equiv P$ 

 $P^F \equiv F$ 

#### **COMPLIMENT LAW**

 $PV \sim P \equiv T$ 

P^~P≡F

~T≡F

~F≡T

#### **INVOLUTION LAW**

 $\sim (\sim P) \equiv P$ 

#### DEMORGAN'S LAW

~(PVQ)≡~P^~Q

~(P^Q)≡~PV~Q

#### **TRUTH TABLE FOR DEMORGAN'S LAW**

р	q	pvq	~p	~q	~(pvq)	~p^~q
Т	Т					
Т	F					

#### **CONDITIONAL STATEMENTS**

If you listen my lecture carefully, then you will definitely understand this topic

Condition -> outcome

if you listen my lecture carefully:p

then you will definitely understand this topic:q

We can represented as "if p then q"

p->q(implication of p)

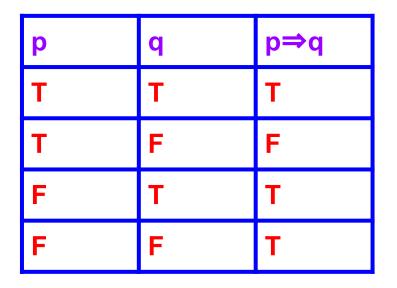
### **CONDITIONAL STATEMENTS**

A compound statement using the connective **if....then** is called a conditional statement or implication .A conditional statement is used as a guarantee for the conclusion to be true provided, condition is true. If p and q are two statements then compound statement if p then q denoted by  $p \Rightarrow q$  is an implication and the connective if .....then is the conditional connective. The connective if.....then is denoted by  $\Rightarrow/\Rightarrow$  and can be read as

- p implies q
- p is sufficient for q
- ponly if q
- q is necessary for p
- q is consequence of p

Note: p implies q and q implies p are completely different statements.

Truth Table for  $p \Rightarrow q$ 



#### **CONVERSE STATEMENT**

The converse of a given conditional statement  $p \Rightarrow q$  is a new statement found by interchanging the hypothesis p and the conclusion q of the given conditional statement.

If  $p \Rightarrow q$  then converse of it is  $q \Rightarrow p$ 

Eg: if i understood this topic, then i listened the lecture carefully.

if i understood this topic:q

then i listened the lecture carefully:p

#### TRUTH TABLE FOR Q⇒P

