

# Discrete Mathematics

## Course Outline:-

- Logics 8-9 Lectures
- Sets
- Functions
- Relations
- Method of proofs
- Graphs
- Trees

## Recommended Book:-

Discrete Mathematics  
and its applications  
by Kenneth H. Rosen  
(8<sup>th</sup> Edition)

(Lecture  
1)

Chapter no 1  
Logics

(Lecture  
2)

## Proposition:-

Any statement which ~~may~~ <sup>is</sup> true or false is called proposition.

## Predicate:-

Any statement about which we are not sure is called predicate.

## Logic Operators:-

### 1) AND operator (Conjunction):-

If any statement is false then all will be false.

example:-  $T \wedge F = F$

### 2) OR Operator (Disjunction):-

If any statement is true then all true.

example:-  $T \vee F = T$

### 3) NOT Operator (Negation):-

It always reverse the value.

example:-  $\neg F = T$

### 4) Implication:-

If first value is true and second is false then result will be false.

If both are same then always true.

example:- i)  $F \rightarrow F = T$

ii)  $T \rightarrow F = F$

5) (~~Implication~~) Bi-Conditional Operator:-

- If both are same then True
- If both are different then False

example:-

$$\text{i) } T \leftrightarrow T = T$$

$$\text{ii) } T \leftrightarrow F = F$$

6) Exclusive OR:-

- Same then False
- If both different then True.

example:-

$$\text{i) } T \oplus F = T$$

$$\text{ii) } F \oplus F = F$$

How to Translate

i) Implication:- If  $p$  then  $q$ ,

ii) Bi-Condition:-  $P$  if and only if  $q$

# How To write Truth Tables

P
T
F

$2^1$

P	Q
T	T
T	F
F	T
F	F

$2^2$

P	Q	R
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F

Example:-

Write Truth Table for  $(p \rightarrow q) \wedge r$

P      Q      R       $(p \rightarrow q)$        $(p \rightarrow q) \wedge r$

T	T	T	T	T
T	T	F	T	F
T	F	T	F	F
T	F	F	F	F
F	T	T	T	T
F	T	F	T	F
F	F	T	T	T
F	F	F	T	F