

Unit - I: Short Q/A

1. Explain about logical Connectives & BiConditional.

A. let $P \wedge Q$ be two propositions. Then the conjunction of the Conditional $P \rightarrow Q \wedge Q \rightarrow P$ is called the BiConditional of $P \wedge Q$. It is denoted by $P \leftrightarrow Q$.

Ex. P : x is an equilateral triangle

Q : x is an equiangular triangle

$P \leftrightarrow Q$:

P	Q	$P \leftrightarrow Q$
T	T	T
T	F	F
F	T	F
F	F	T

2. Explain about logical Equivalence

A. Two proposition u and v are said to be logically Equivalent whenever u & v have identical truth values (or) Equivalently

whenever the BiConditional $u \leftrightarrow v$ is a tautology

and it is denoted by $u \equiv v$.

3. Define (i) tautology (ii) Contradiction

A. (i) Tautology: A Compound proposition which is true for all the possible truth values of its components is called a tautology and it is denoted by T .

and it is denoted by F_0

Ex: $P \vee (NP)$

P	NP	$P \vee (NP)$
T	F	T
F	T	T

(ii) Contradiction:

A Compound proposition which is false for all the possible truth values of its components is called a Contradiction and

It is denoted by F_0

Ex: $P \wedge (NP)$

P	NP	$P \wedge (NP)$
T	F	F
F	T	F

4) Define Universal quantifiers

A) The phrases for all x , for every x , for each x is called

Universal quantifiers. It is denoted by \forall

Ex: All Even integers are divisible by 2

5) Define Existential quantifiers

A) The phrases like for some x , there exist an x , there is

Atleast one x are called Existential quantifiers and it is denoted by \exists

Ex: for some $x, x > 0$

6) Write the Min terms of P, q, r

A) The Min terms of P, q, r is $P \wedge q \wedge r, \neg P \wedge \neg q \wedge \neg r,$
for any 3 variables are P, q, r The min terms are

$$\neg P \wedge q \wedge r, P \wedge \neg q \wedge r, P \wedge q \wedge \neg r$$

$$\neg P \wedge \neg q \wedge r, P \wedge \neg q \wedge \neg r,$$

$$\neg P \wedge q \wedge \neg r$$

7) Define De Morgan's laws:

$$A) \quad \neg(P \vee q) \equiv \neg P \wedge \neg q$$

$$\neg(P \wedge q) \equiv \neg P \vee \neg q$$

8) Define Duality law

1) Two formulae x and x^* are said to be duals of each other. If one can be obtained from the other

By replacing \wedge by \vee and

\vee by \wedge . The Connectives \wedge and \vee are

also called Duals of each other

Ex: $U \equiv (P \vee q) \wedge r$

$$U^d \equiv (P \wedge q) \vee r$$

9) Define well-formed formulae

A) A well-formed formulae can be generated by the following rules.

* A Statement Variable standing alone is a well-formed formulae

* If A is a well-formed formulae. Then $\neg A$ is a well-formed formulae

* If A and B are well-formed formulae. Then $(A \wedge B)$, $(A \vee B)$, $(A \rightarrow B)$, $(A \leftrightarrow B)$ are well-formed formulae.

10) Define PCNF & PDNF

PDNF: Principle disjunctive Normal form:

An equivalent formulae consisting of disjunction of min terms only is known as its principle disjunctive Normal form

Such a Normal form is also known as Sum-of-products in a Canonical form.

PCNF:

An Equivalent formulae consisting of conjunctions of Max terms only is known as its principle conjunctive Normal form

Such a normal form is also known as product-of-Sums in a Canonical form.