

IGRA NATIONAL UNIVERSITY

PESHAWAR

SUB BY SHARIQ

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SUB TO SIR DAUD

SUB DISCRETE
STRUCTURE.

Q1
 (a) $(p \wedge q) \wedge r = p \wedge (q \wedge r)$

p	q	r	$p \wedge r$	$(p \wedge r) \wedge q$	$q \wedge r$	$p \wedge (q \wedge r)$
T	T	T	T	T	T	T
F	T	T	F	F	F	F
T	F	T	F	F	F	F
F	F	T	F	F	F	F
T	T	F	T	F	F	F
F	T	F	F	F	F	F
T	F	F	F	F	F	F
F	F	F	F	F	F	F

Q1

$$(P \wedge q) \vee (\sim P \vee (P \wedge \sim q))$$

P	q	$\sim P$	$\overset{P}{\sim q}$	$\sim Pq$	$(P \wedge q)$	$(P \wedge \sim q) \vee (\sim P \vee (P \wedge \sim q))$	$(P \wedge \sim q) \vee (\sim P \vee (P \wedge \sim q))$	$(P \wedge q) \vee (\sim P \vee (P \wedge \sim q))$	$(P \wedge q)$
T	T	F	F	F	T	F	F	T	
F	T	T	T	F	F	F	T	T	\emptyset
T	F	F	F	T	F	F	F	T	
F	F	T	T	T	F	F	T	T	

Q 1 :-

b.

P = you have the flu

q = you miss the final exam

Y = you pass the course.

1.

$$P \rightarrow q$$

If you have flu then you will miss the final exam.

2. $\sim q \leftrightarrow Y$

If you don't miss the final exam you will pass the course.

3. $(\sim P \vee \sim q) \wedge q$

If you have neither flu nor miss the exam you will pass the course.

Q2 :-

a. $P \rightarrow q$ $q \therefore P$ invalid
Truth table.

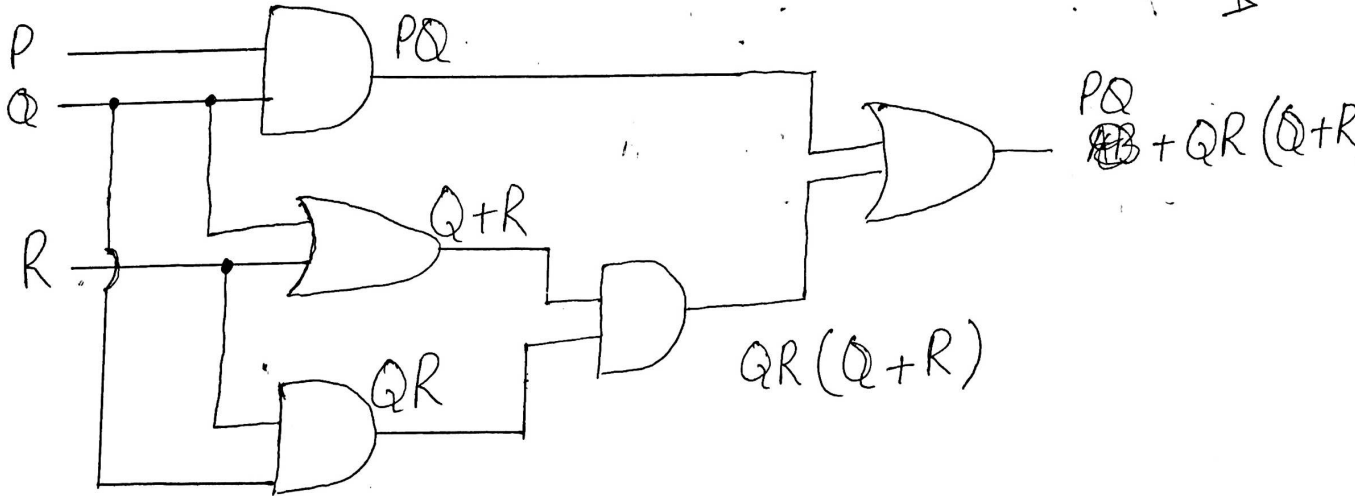
	P	q	$P \rightarrow q$	q	P
→	T	T	T	T	T
	T	F	F	F	
	F	T	T	T	
	F	F	T	F	

Q No 2:

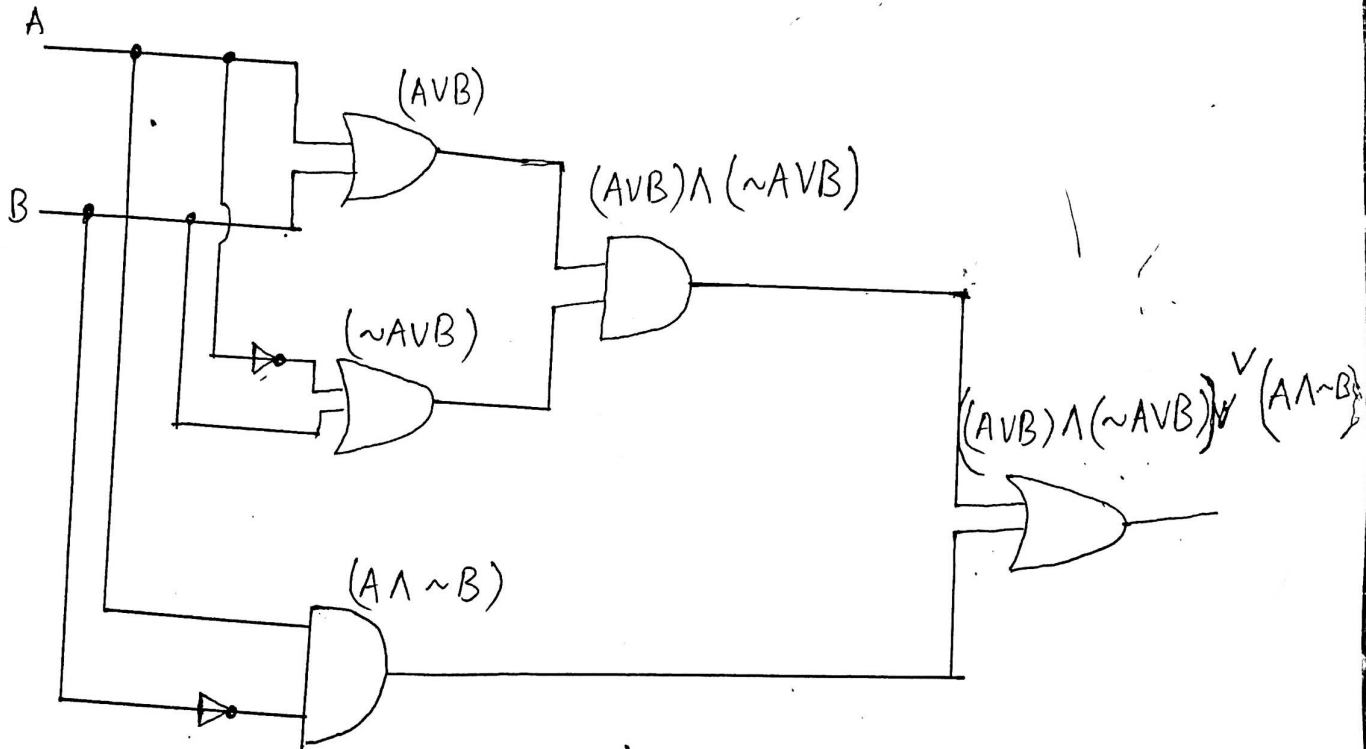
Part B

$$PQ + QR(Q+R)$$

Y



$$2. (A \vee B) \wedge (\sim A \vee \sim B) \vee (A \wedge \sim B)$$



Q3 :-

Part A.

$$A = \{a, b, c\}$$

$$P(A) = \{ \emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \\ \{a, c\}, \{b, c\}, \{a, b, c\} \}$$

$$B. \{1, 2, 3, 4\}$$

$$P(B) = \{ \emptyset, \{1\}, \{2\}, \{3\}, \{4\}, \\ \{1, 2\}, \{1, 3\}, \{1, 4\}, \{2, 3\}, \\ \{2, 4\}, \{3, 4\}, \{1, 2, 3\}, \\ \{1, 2, 4\}, \{1, 3, 4\}, \{2, 3, 4\}, \\ \{1, 2, 3, 4\} \}$$

Q3

(b) Sets:

A well defined collection of distinct objects is called set.

The objects are called the elements or member of the set.

There are three forms

- *. Tabular form
- *. Discriptive form
- *. Set builder form.

Tabular form.:

We list all the elements of a set, separated by commas and enclosed within braces or curly brackets $\{ \}$

Example:

$$A = \{ 1, 2, 3, 4, 5 \}$$

$$C = \{ 1, 3, 5, 7, 9 \}$$

Discriptive form:-

We state the elements of set in words.

Example:-

We describe the elements in word like if we state set of first five integers.

$A =$ Set of first five even number.

Set builder form:

We write the common characteristic in symbolic form, shared by the all element of the set.

Example:

$$A = \{x \in \mathbb{N} \mid x \leq 5\}$$