Summer-20 Mid Term Assignment

Subject: Discrete Structure

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Discipline: BSSE (Section A) 8^{th} Semester

Note: Attempt all Questions. All questions carry equal marks. (30)

Question No. 1:

a) Show that $(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$ and $(p \wedge q) \vee (\sim p \vee (p \wedge \sim q))$ is a tautology with the help of truth table. (05)

Answer:
Associative Law $(p \wedge q) \wedge r \equiv p \wedge (q \wedge r)$

				L.H.S		R.H.S
p	**q**	**r**	**$(p \wedge q)$**	**$(p \wedge q) \wedge r$**	**$(q \wedge r)$**	**$p \wedge (q \wedge r)$**
T	T	T	T	T	T	T
T	T	F	T	F	F	F
T	F	T	F	F	F	F
T	F	F	F	F	F	F
F	T	T	F	F	T	F
F	T	F	F	F	F	F
F	F	T	F	F	F	F
F	F	F	F	F	F	F

Hence Proved, L-H-S is equal to R-H-S.

(p ∧ q) ∨ (~ p ∨ (p ∧ ~q))

p	**q**	**(p ∧ q)**	**~ p**	**~ q**	**p ∧ ~q**	**(~ p ∨ (p ∧ ~q)**	**(p ∧ q) ∨ (~ p ∨ (p ∧ ~q))**
T	T	T	F	F	F	F	T
T	F	F	F	T	T	T	T
F	T	F	T	F	F	T	T
F	F	F	T	T	F	T	T

b) Let **p**, **q**, and **r** be the propositions, where **p = "you have the flu"**, **q = "you miss the final exam"** and **r = "you pass the course"**. Express the English sentence as propositions. (05)

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

   Answer: p→q

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

   Answer: ~q→r

3. If you neither have flu nor miss the final exam, then you will pass the course.
   Answer: ~p∧~q→r

Question No. 2:

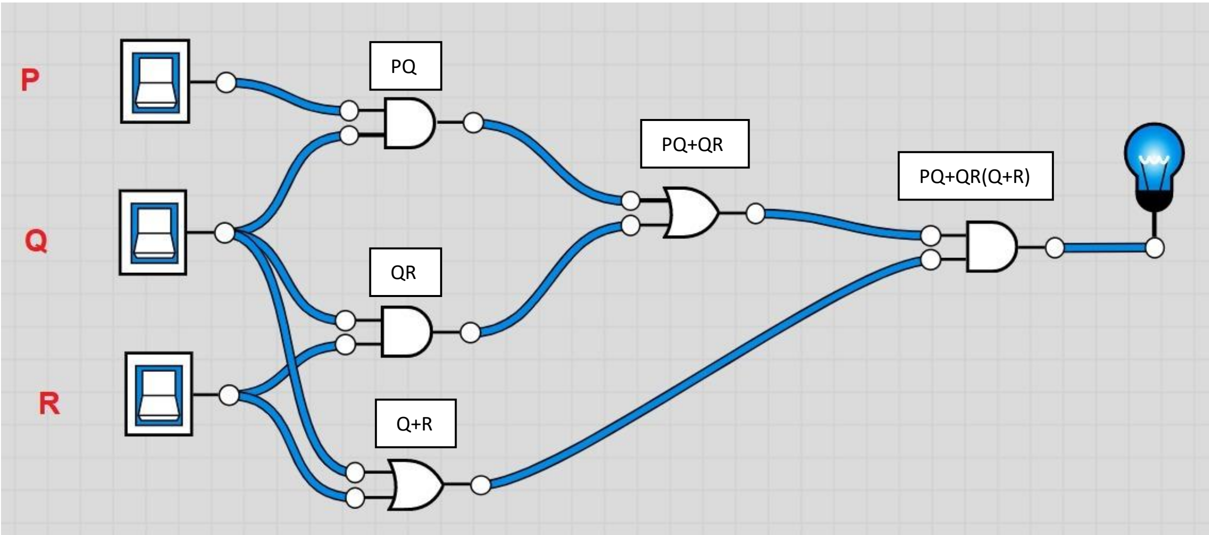
a) Show that the given argument form is invalid p→q q ∴ p with the help of truth Table (05)

p	**q**	**p→q**	**(p→q)^q**	**[(p→q)^q] →q**
T	T	T	T	T
T	F	F	F	T
F	T	T	T	F
F	F	T	F	T
Since it's this the argument as a single statement is not always true we could say the argument is invalid so that is really the conclusion the question was whether or not the argument is valid or not the answer is INVALID				

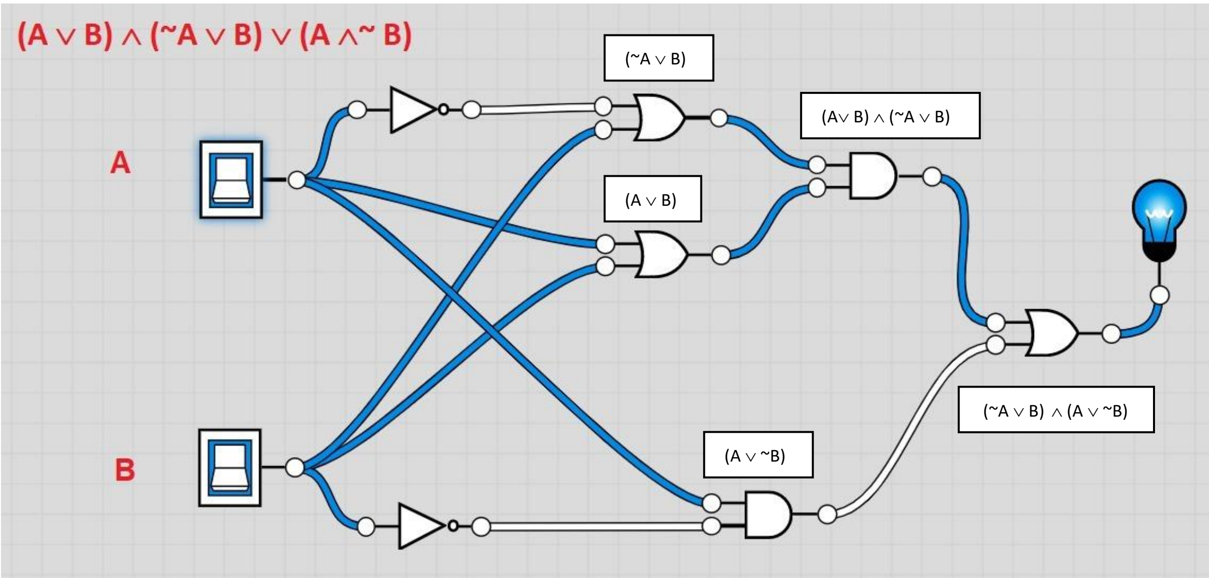
b) Draw circuit diagram for **1**. PQ+QR (Q+R) **2**. (A ∨ B) ∧ (~A ∨ B) ∨ (A ∧~ B) (05)

Answer:

1: PQ+QR (Q+R)



2: (A ∨ B) ∧ (~A ∨ B) ∨ (A ∧~ B)



Question No. 3:

a) If A = {a, b, c} and B = {1,2,3,4} find P (A) and P (B). (05)
Answer:

- P(A)= 2^{3} = 8
  P(A)= { ∅, (a), (b), (c), (a,b), (a,c),(b,c),(a,b,c)}

- P(B)= 2^4= 16
  P(B)={∅,{1,2,3,4},{1,2,3},{1,2,4},{1,3,4},{2,3,4},{1,2},{1,3},{1,4},{2,3},{2,4},{3,4},{1},{2},{3},{4}}

b) Briefly discuss three forms of set with the help of example. (05)
Answer:

1: Tabular Form:

Listing all the elements of a set, separated by commas and enclosed within braces or curly brackets {}. The most used from of set.

Example: In the following examples we write the sets in Tabular Form.

A = {1, 2, 3, 4, 5} is the set of first five Natural Numbers.

B = {2, 4, 6, 8, …, 50} is the set of Even numbers up to 50.

C = {1, 3, 5, 7, 9 …} is the set of positive odd numbers.

2: Descriptive Form:

Stating in words the elements of a set. The elements are not mentioned itself but stated In words.

Example: Now we will write the same examples which we write in Tabular Form, in the Descriptive Form.

A = set of first five Natural Numbers.

B = set of positive even integers less or equal to fifty.

C = set of positive odd integers.

3: SET BUILDER FORM:

Writing in symbolic form the common characteristics shared by all the elements of the set.

Example: Now we will write the same examples which we write in Tabular as well as Descriptive Form, in Set Builder Form.

A = {x ÎN / x<=5}

B = {x Î E / 0 < x <=50}

C = {x ÎO / 0 < x}