Practical Session Week 1A

Objectives

1. To draw the logic ~~gate circuit~~ ~~Bo~~olean expressions
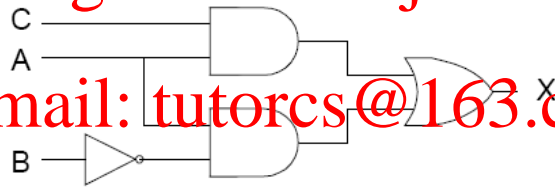2. To write down ~~the Boolean expressi~~ons of given circuit diagrams
3. To find Boolea~~n~~

Tasks
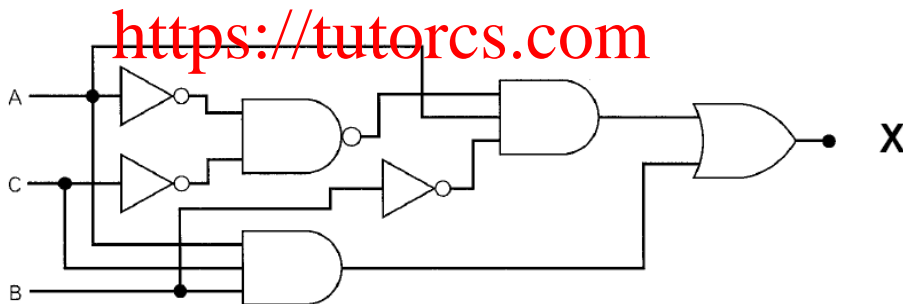
1. Draw the logic gate circuit corresponding to the following Boolean expression

   $F = (A'.B + A.B) + (C'.D' + C.D)$

2. Write the Boolean expression of the following circuit diagram. Set up the truth table

3. Write the Boolean expression of the following circuit diagram. Set up the truth table

4. Compare X of exercise 2 and exercise 3. Keep in mind that the Boolean expression of X in exercise 3 can be simplified to the one of exercise 2.

5. Find the Boolean expression of function $f(x,y,z)$ with three inputs and one output; $f(x,y,z)$ produces 1 when at least two of the inputs are 1, otherwise it produces 0.

Step1: set up the truth table

x	y	z	$f(x, y, z)$
		0	
		1	
		0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Step2: find all the Boolean sub-expressions only when $f(x,y,z)=1$, e.g., when (x=0,y=1,z=1). The sub-expression is generated by inverting the inputs with zero and keeping the rest as they are, e.g., the subexpression for *(x=0,y=1,z=1) is x'yz.*

Step3: *f(x,y,z)* is given by adding all the sub-expressions found in step2.

Step4 (this step is optional and will not be assessed): Simplify f(x,y,z) using Boolean algebra. For those who are interested in how to simplify Boolean expressions, they can read the following link (Karnaugh maps) https://www.geeksforgeeks.org/k-mapkarnaugh-map/

6. Revisit and study the 4-bit ripple carry adder shown in the slides. Draw the circuit for an 8-bit ripple carry adder