Assignment-M1

Digital Logic Design

Basic Logic Gate:

1. **Write down** the **truth table, logic, logic expression** and **draw the logic symbol** for each of the following gates

a. NOT (1 input)	**b. OR**	**c. AND**	**d. NAND**
e. NOR	**f. XOR**	**g. XNOR**	

with 3 inputs.

Logic Simplification with Boolean algebra:

2. Using **Boolean algebra** and **De Morgan's Rule where applicable**, **simplify** the following expressions
   - *a.* $AB+A(B+C)+B(B+C)$
   - b. $A\bar{B}+A(\overline{B+C})+B(\overline{B+C})$
   - c. $[AB(C+\overline{BD})+\overline{AB}]CD$
   - d. $\overline{AB+AC}+\bar{A}\bar{B}C$

Building Combinational Logic Circuit and Universal Gates

3. For the following output expressions, **design the combinational logic circuits with basic logic gates** (**use Boolean algebra to reduce the expressions where possible**).
   a. For the designed logic circuits, **redraw** each of them with only **Universal NAND gates only**.
      i. $ABC+A\bar{B}\bar{C}+\overline{AC}$
      ii. $AC+AB+B\bar{C}$
   b. For the designed logic circuits, **redraw** each of them with only **Universal NOR gates only**.
      i. $A\bar{B}C+A\bar{B}\bar{C}+\overline{AC}$
      ii. $AC+\bar{A}B+B\bar{C}$

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