National University of Computer & Emerging Sciences, Karachi
Spring -2022 CS-Department
Assignment 2

Course Code: EE-1005	**Course Name: Digital Logic Design**
Instructor Name: Sumaiyah Zahid	
Student Roll No:	**Section:**

Instructions:

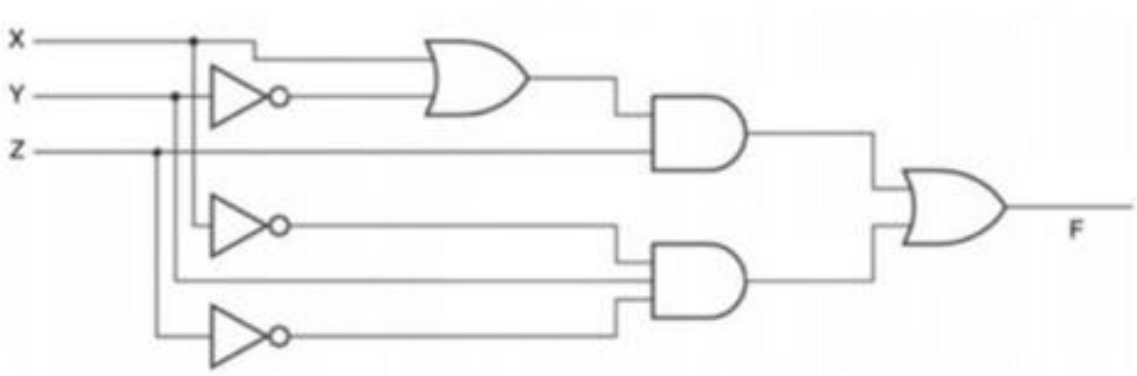
- ***In case of any plague you will be given straight 0.***

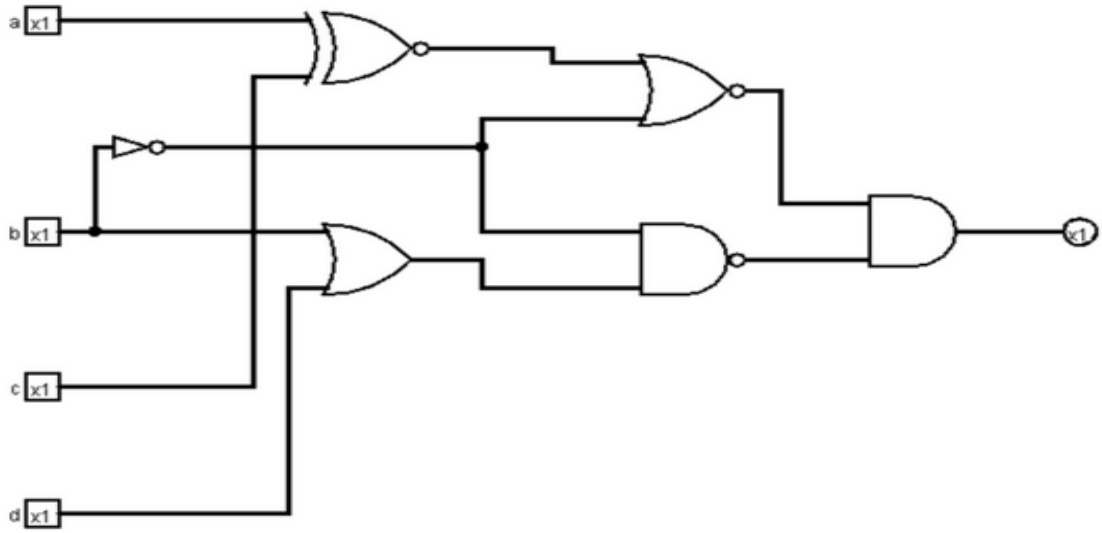
Total Marks: 70

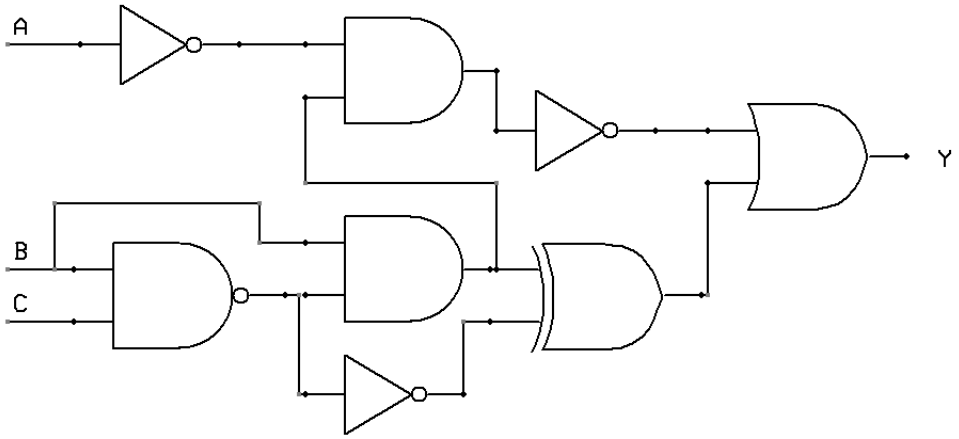
Logic Diagram **Marks: 35**

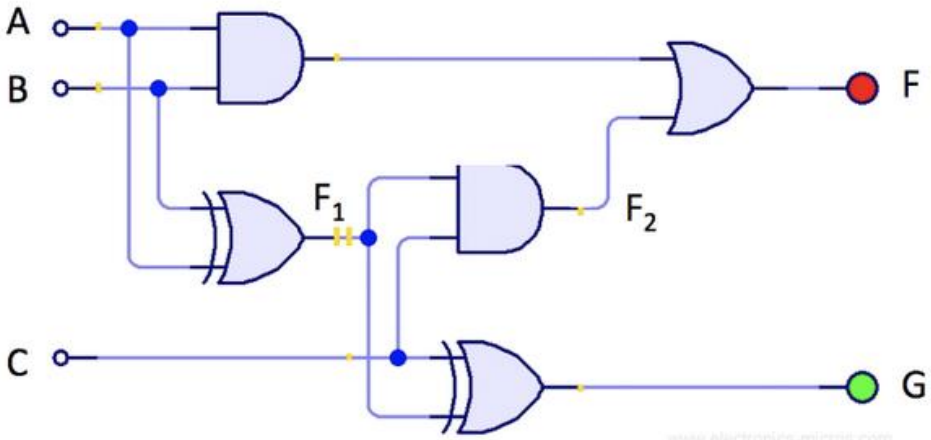
Do the following tasks for all 5 logic diagrams:

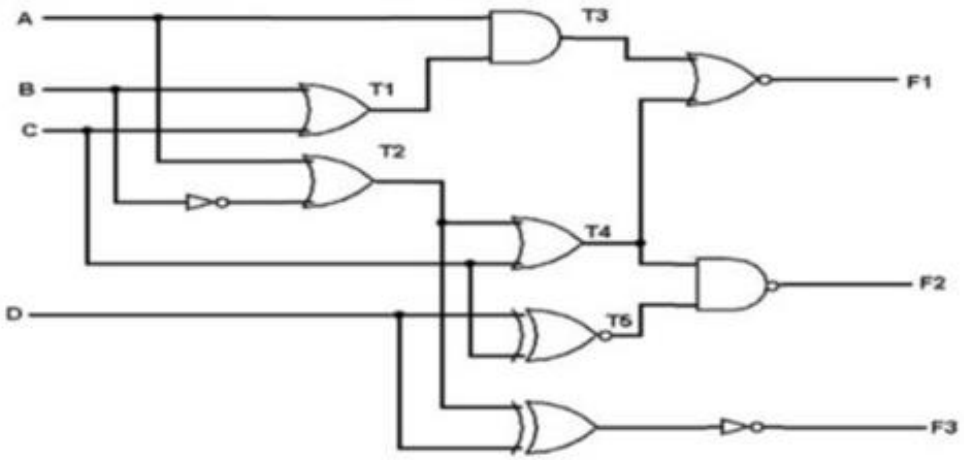
- Write a Boolean expression for output.
- Write equivalent SOP and POS
- Derive a simplified expression (if possible)
- Draw a simplified Truth Table
- Draw a simplified circuit using AND, OR, NOT gates only
- Draw a simplified circuit using NAND gates only
- Draw a simplified circuit using NOR gates only











Word Problems **Marks: 35**

1. Design a combinational circuit with 4 inputs and one output. The output will only be high when majority of inputs are high.
2. Design a combinational circuit with 4 inputs and one output.
   - The output y is 1 if the binary value of the input is 5 or less than 5.
   - The output y is 1 if the binary value of input is 9 or more than 5.
3. Design a combinational circuit with 4 inputs A, B, C, D and one output.
   - The output y is 1 for binary even number.
   - The output z is 1 for binary odd number.
4. Develop an AND-OR-Invert logic circuit for a power drive which switches *on* (logic 1) when the guard is in place (logic 1) and switches *off* (logic 0) when the motor is too hot (logic 0).

5. An AOI (AND-OR-Invert) logic chip has two 4-input AND gates connected to a 2-input NOR gate. Write the Boolean expression for the circuit (assume the inputs are labeled *A* through *H*).

6. A battery-powered lamp in a room is to be operated from two switches, one at the back door and one at the front door. The lamp is to be on if the front switch is on and the back switch is off, or if the front switch is off and the back switch is on. The lamp is to be off if both switches are off or if both switches are on. Let a HIGH output represent the on condition and a LOW output represent the off condition.

7. Draw a logic diagram from the truth table given below.

TABLE 5–9

Inputs				Output
A	*B*	*C*	*D*	*X*
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1