Course: Digital Engineering Semester: 1st term 2025/2026.	Lecturers: Dr. Osama Elnahas, Dr. Dina Abdelhafiz, Dr. Bassant Tolba, Dr. Radwa Rady Assistant: ….
Tutorial 1: Digital Engineering	

Answer the following questions:

Q1. Draw the Logic Circuit diagram for the following Boolean expression

a) $F = \overline{AB} + \overline{C}(E + \overline{D})$

b) $F = [A + \overline{BCD}\,][\overline{AD} + B(\overline{C} + A)]$

c) $F = \overline{\overline{A} + B} + \overline{A}.(C + \overline{B})$

Q2. Find the Boolean expression output and the complement for the following circuits.

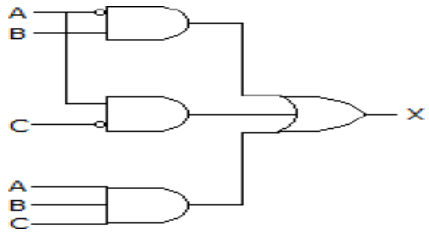

Fig. 1

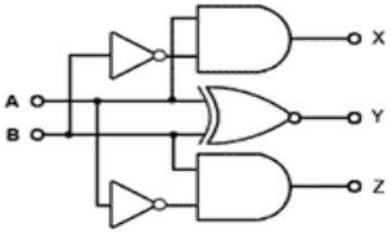

Fig. 2

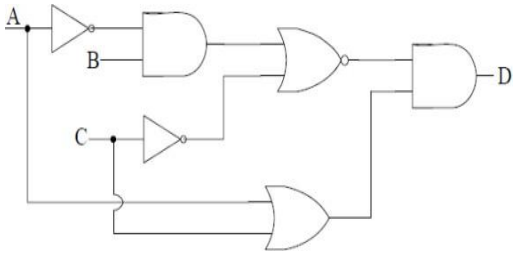

Fig. 3

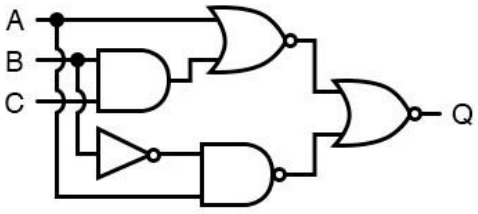

Fig. 4

Q3. **Apply** DeMorgan's Law **to the following expressions:**

a) $F = \overline{\overline{AB} + \overline{C}(E + \overline{D})}$
b) $F = \overline{(\overline{A + B})(A + \overline{AB})}$
c) $F = \overline{\overline{A(B + C)} + \overline{C}E\overline{D}}$
d) $F = \overline{(\overline{ABCE})}\overline{C}(E + \overline{D})$

Q4. **Find the duals of the logic expressions in** Q3**.**

Q5. **Write down the truth table for a logic expression in** Q1 (c) and Q3 (b)**.**

Q6. **Apply Graphical DeMorgan's Theorem to the following logic circuits:**