

Medical Instrumentations Techniques Engineering  
Al-Rasheed University College  
Second Level

# Digital Techniques

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## Lecture 05

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## **LOGIC CIRCUITS DISCRIBTION**

Any logic circuit, no matter how complex, may be completely described using the Boolean operations that are related to its logic gates. On the other side, the logic circuits can be implemented from their Boolean expressions.

### **Lecture objectives**

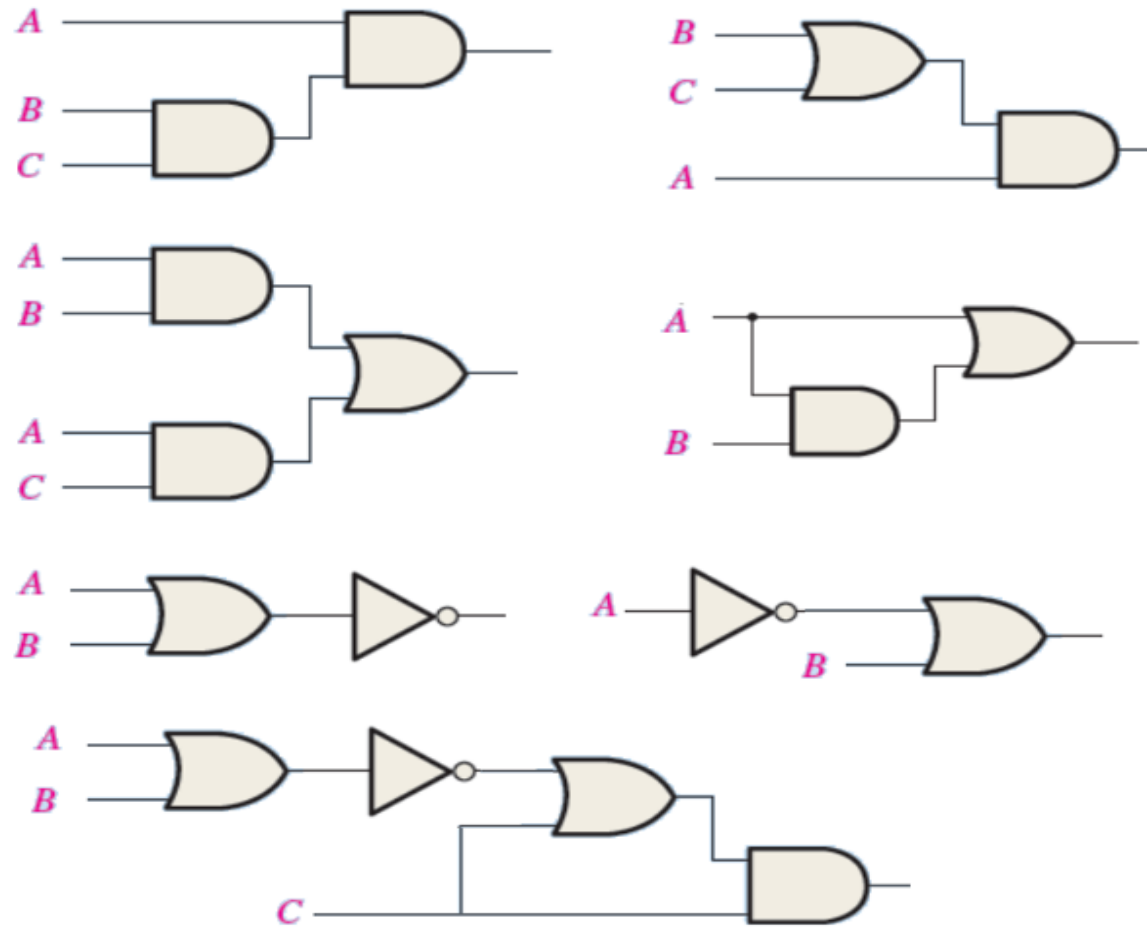
At the end of this lecture, the student should be able to:

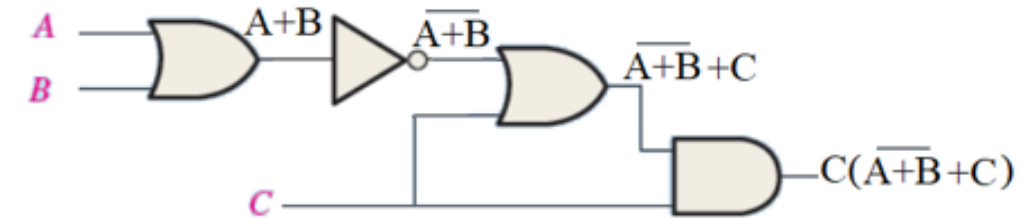
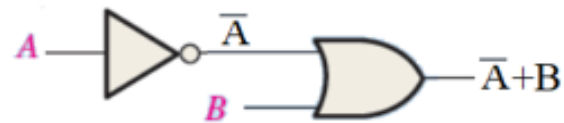
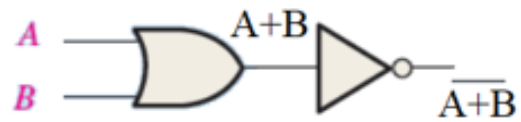
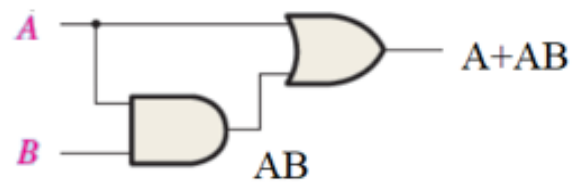
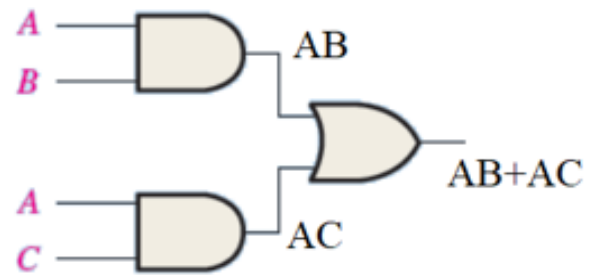
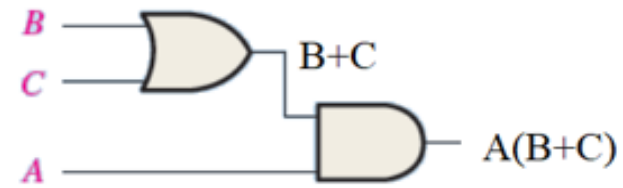
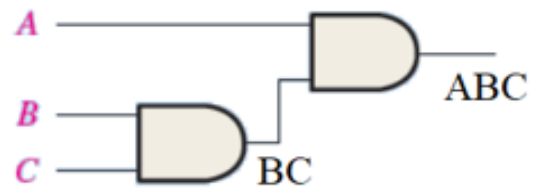
- 1- Determine the output expression for the logic circuit.
- 2- Implementing the logic circuit from its Boolean expressions.

## **Describing logic circuits algebraically**

The output expression of the logic circuit can be described by following the sequence of the inputs in the logic gates and describing their outputs.

**Example:** Determine the output expression for the logic circuits shown below:





## Implementing circuits from Boolean expressions

If the operation of a circuit is defined by a Boolean expression, a logic-circuit can be implemented directly from that expression.

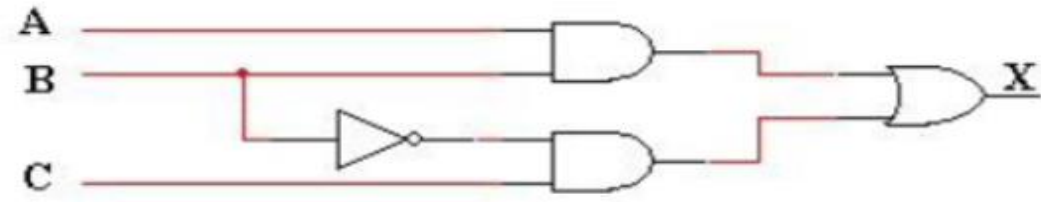
**Example:** Implement the logic circuits defined by the following Boolean expressions:

A)  $AB + \bar{B}C$

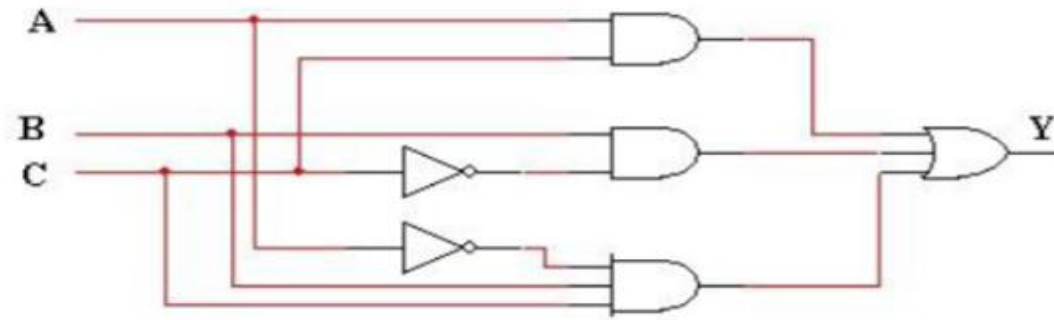
B)  $AC + B\bar{C} + \bar{A}BC$

C)  $C + (\overline{A + B} + C)$

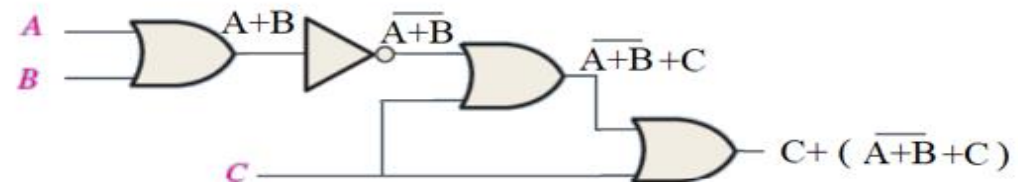
A)



B)



C)



### Exercise (Lecture 05)

Determine the output expression for the following circuit, and determine the output at  $A=1$ ,  $B=0$ ,  $C=1$ , and  $D=1$ .

