Lecture Six: **Boolean algebra :**

Boolean variable is a quantity that is either (1) or (0) .

 Boolean algebra is a mathematical method to manipulate Boolean variable in order to simplify the Boolean equation .

There are three basic operation in Boolean algebra :

1- OR (logical addition) (+)

2- AND (logical multiplication) (.)

3- NOT (logical inversion) ( )

**Gate :**

 It is a device with one output and two or more inputs . output is related to the input in Boolean (logic) equation .

 In the following , the basic logic gates with their symbols , truth table and equation :

 **Gate Symbol Truth table Equation**

 AB Z

 00 0

 01 1

 OR A Z 10 1 Z=A+B

 B 11 1

 AB Z

 00 0

 01 0

 AND A Z 10 0 Z=A.B

 B  11 1

 A Z

 0 1

 NOT A Z  1 0 Z=A

 AB Z

 00 1

 01 1

 NAND  A Z10 1 Z=A.B

 B  11 0

 AB Z

 00 1

 01 0

 NOR A  Z  10 0 Z=A+B

 B  11 0

 AB Z

 00 0

 01 1

 EX\_OR A  Z 10 1 Z=A ⊕ B

 B 11 0

 AB Z

 00 1

 01 0 Z=A⊕ B

EX\_NOR A Z  10 0

 B 11 1

***EX***: Describe the T.T. for three input OR- gate :

 ABC Z

 000 0 A

 B Z  001 1

 C  010 1

 011 1

 100 1

 101 1

 110 1

 111 1

***EX***: Describe the T.T for the following logic circuit :

 A ABC Z

B  000 1

 Z  001 0

 C  010 1

 011 0

 100 1

 101 0

 110 1

 111 1

***H.w.***: Describe the T.T for the following :

A

A  B

B Z C Z

 c

 A A

 B B  Z

C Z

 D