MPHYCC-7 (Electronics)

PG Sem-II

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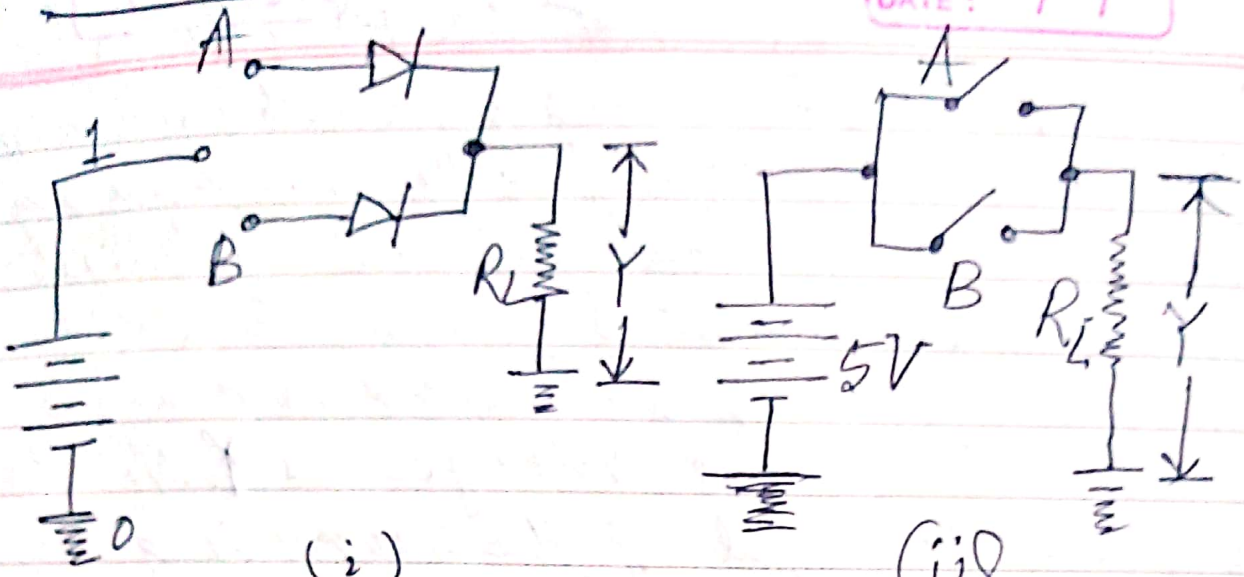
Teacher's Signature

OR gate



(i) (ii)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(iii)

fig. (1)

An OR gate is a logic gate that has two or more inputs but only one output. However, the output Y of an OR gate is LOW when all inputs are LOW. The output Y of an OR gate is HIGH if any or all the inputs are HIGH.

It is called OR gate because the output is high if any or all the inputs are high. For the same reason, an OR gate is ~~LOW~~ sometimes called a "any or all gate". For example

Consider a 2-input OR gate. The output Y will be high if either or both inputs are high.

*OR gate operation: Fig 1(i) shows one way to build a 2-input OR gate while Fig 1(ii) shows its simplified schematic diagram. The input voltages are labelled as A and B while the output voltage is Y. Note that negative terminal of the battery is grounded and corresponds to 0 state (LOW level). The positive terminal of the battery (+5 V) corresponds to 1 state (HIGH level). There are only four input-output possibilities.

(i) When both A and B are connected to ground both diodes are non-conducting. Hence, the output voltage is ideally zero (low voltage). In terms of binary, when A=0 and B=0, then Y=0 as shown in the truth-table in Fig. 1(iii).

(ii) When A is connected to ground and B connected to the positive terminal of the battery, diode D_2 is forward biased and diode D_1 is non-conducting. Therefore, diode D_2 conducts and the output voltage is ideally +5V. In terms of binary, when A=0 and B=1, then Y=1.

(iii) When A is connected to the positive terminal of the battery and B to the ground, diode D_1 is on and diode D_2 is off.

Again the output voltage is +5V. In binary terms, when A=1 and B=0, then Y=1 [Fig. 1 (iii)]

(iv) When both A and B are connected to the positive terminal of the battery, both diodes are on. Since the diode are in parallel, the output voltage is +5V. In binary terms, when A=1 and B=1, then Y=1 [Fig. 1 (iii)].

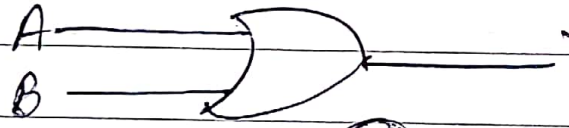


Fig. (2).

It is clear from the truth table that for OR gate, the output is high if any or all of the inputs are high. The only way to get a low output is by having all inputs low. Fig (2). shows the logic symbol of OR gate. Note that the symbol has curved line at the input.

* Boolean expression:

A + B	=	Y
0 + 0	=	0
0 + 1	=	1
1 + 0	=	1
1 + 1	=	1

Truth Table

The algebra used to symbolically describe logic functions is called Boolean algebra. The "+" sign in Boolean algebra refers to the

logical OR function. The Boolean expression for OR function is

$$A + B = Y$$

↑

OR symbol