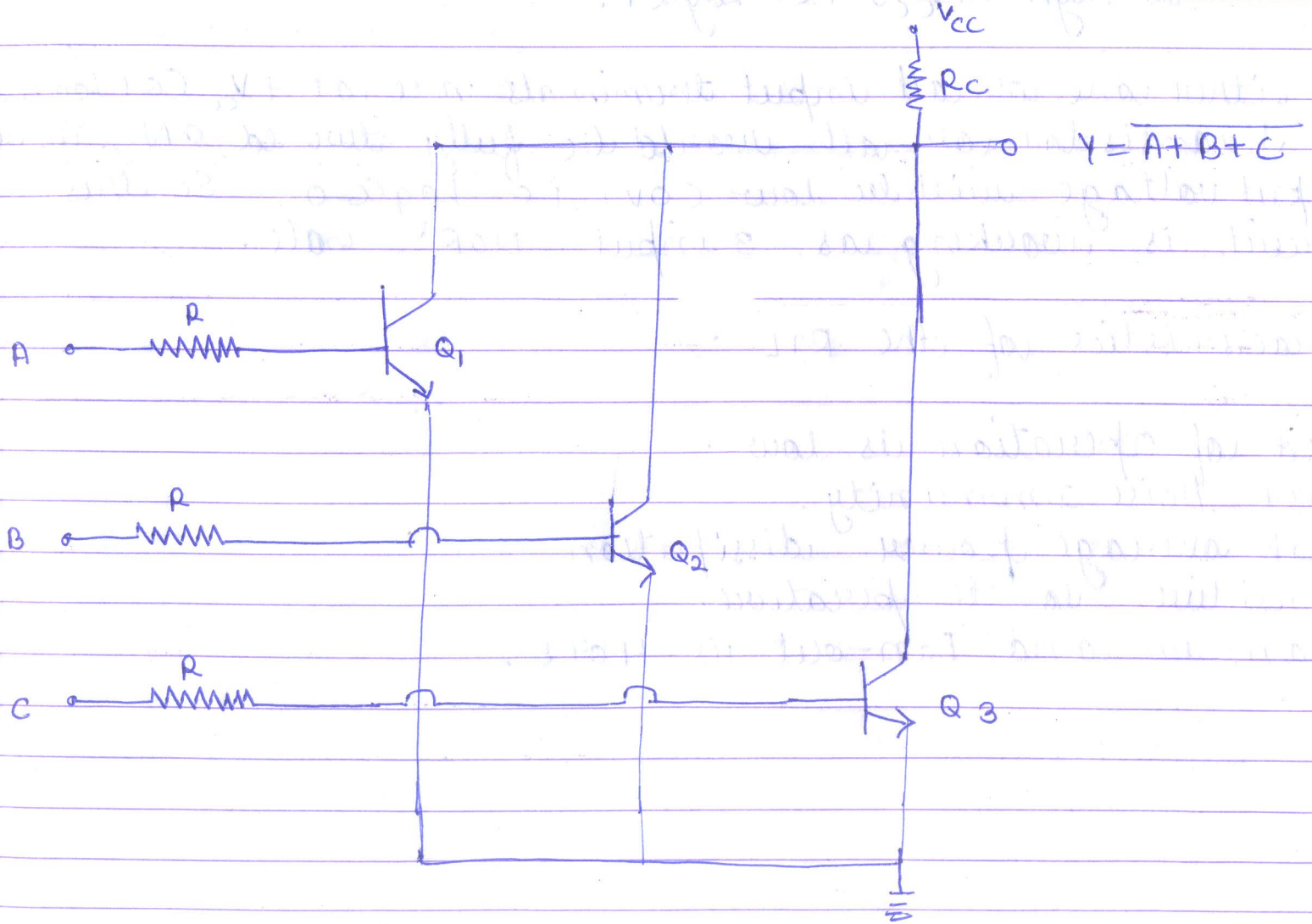
GWPC, Ajmer (II Mid Term Test 2017-18)

EL-205 [Digital Circuit Electronics]

Lecturer :- Priyanka Saini Time :- 1Hr M. Marks -15

Ques.1. Explain the working of a 3 input RTL (Resistor Transistor logic) NOR gate Also write its main characteristics ? —(5)

Ans :-



Basic Diag of RTL NOR Gate

Working :- When the inputs A, B and C are at 0V (or logic 0), the transistors are turned OFF. Hence the output goes to high ($+V_{CC}$) i.e. Logic 1.

→ If either one or all input terminals are at $+V_{CC}$ (or logic 1), one transistor or all would be fully turned ON, therefore output voltage will be low (0V) i.e. Logic 0. So this circuit is working as 3 input NOR gate.

Characteristics of the RTL :-

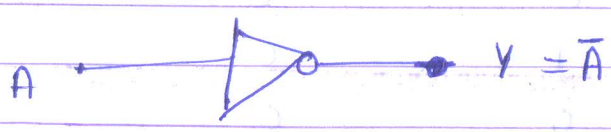
1) Speed of operation is low.
2) Poor Noise Immunity.
3) High average power dissipation.
4) Sensitive to temperature.
5) Fan-in and Fan-out is 4 or 5.

Ques2. Design via NOT, AND, OR gates using Universal gates. — (6)

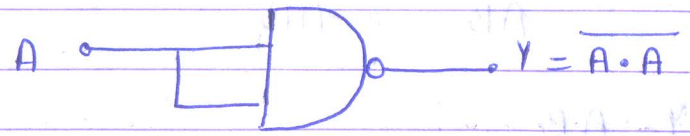
Ans2 a) NOT Gate :-

i/p A	o/p Y
0	1
1	0

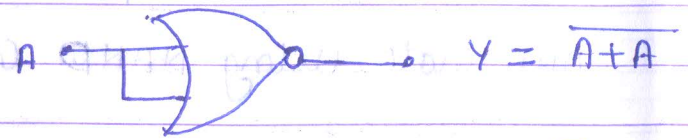
Truth Table



Symbol



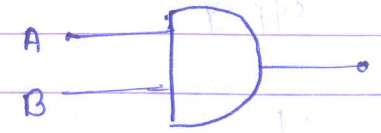
NOT Gate Using NAND Gate

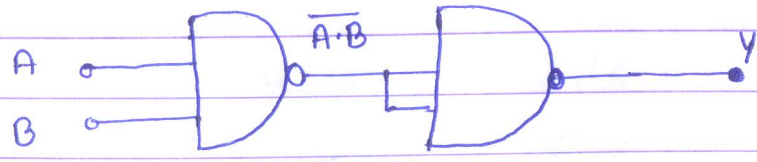


NOT Gate Using NOR Gate

(b) AND Gate :-

i/p		o/p
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1



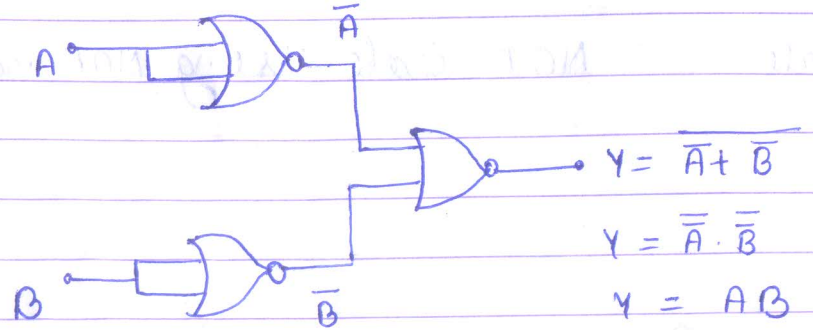


$Y = \overline{\overline{AB} \cdot \overline{AB}}$

$= \overline{\overline{AB}} = AB$

AND Gate using NAND Gate

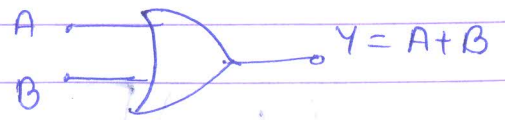
$Y = AB$

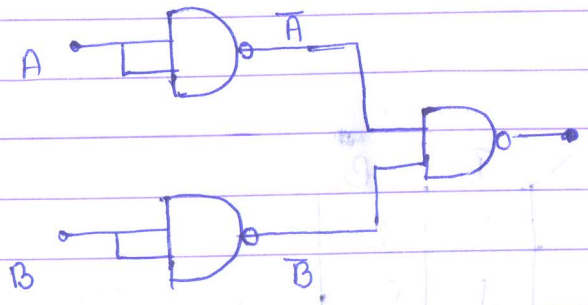


AND Gate using NOR Gate

(c) OR Gate:-

I/P		O/P
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1



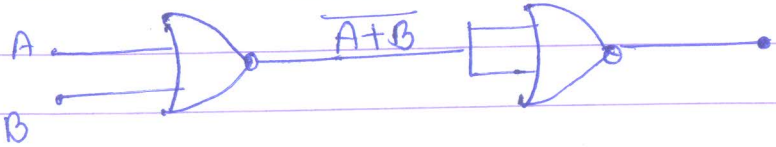


$Y = \overline{\overline{A} \cdot \overline{B}}$

$Y = \overline{A} + \overline{B}$

$Y = A + B$

OR Gate Using NAND Gate



$Y = \overline{\overline{A+B} + \overline{A+B}}$

$= (\overline{\overline{A+B}}) \cdot (\overline{\overline{A+B}})$

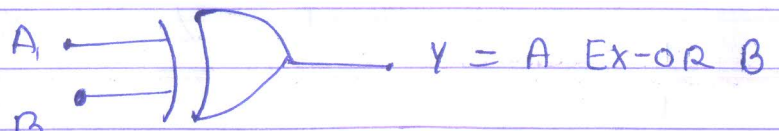
$= (A+B) \cdot (A+B)$

$Y = (A+B)$

OR Gate Using NOR Gate

Qus 3. Draw the Truth Table and Logic Symbol of Ex-OR & Ex-NOR Gate. Find the expression of Result using K-map. — (4)

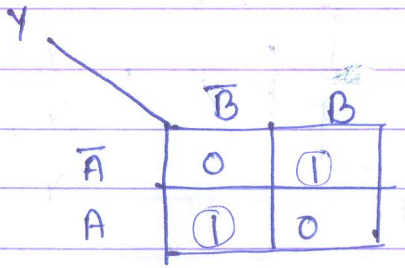
Ans. Ex-OR :-



Symbol of Ex-OR Gate

i/p		o/p
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

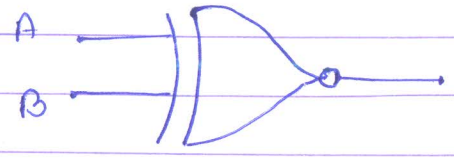
Truth Table of Ex-OR Gate



$Y = \bar{A}B + A\bar{B}$

$Y = A \oplus B$

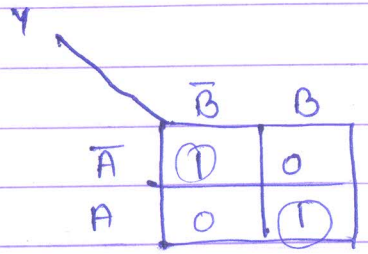
Ex-NOR :-



Symbol of Ex-NOR Gate

i/p		o/p
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

Truth Table of Ex-NOR Gate



$Y = A\bar{B} + \bar{A}\bar{B}$

$Y = A \odot B$

प्रियंका सैनी

(PRIYANKA SAINI)

Lecturer Electronics

GWPC, Ajmer