DIGITAL SYSTEM

6th PRACTICUM: KARNAUGH MAP

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PRACTICUM ACTIVITIES

1st Experiment

1. Create a combination of logic gates based on the following karnaugh map.

		AB			
		00	**01**	**11**	**10**
CD	**00**	0	0	0	0
	01	1	1	1	0
	11	0	1	1	1
	10	0	0	0	0

I = 0101 II = 0001 III = 1111

1101 0101 1011

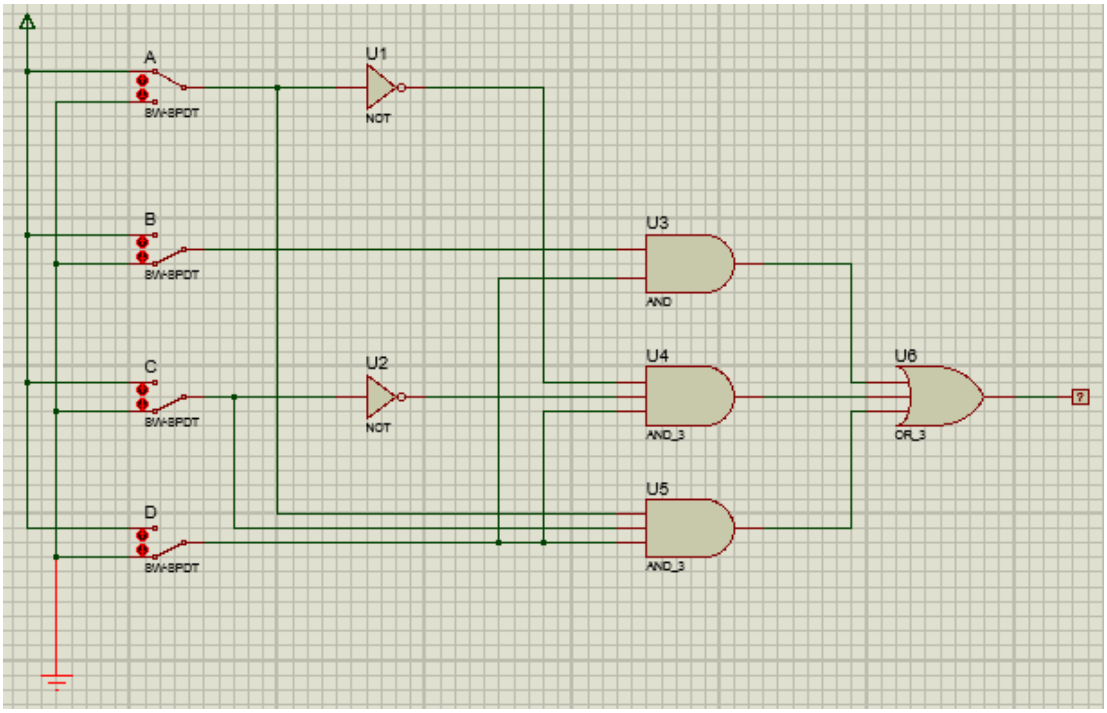
0111 **A'C'D** **ACD**

1111

BD

2. Boolean function: **F = BD + A'C'D + ACD**

3. Create logic gates based on your boolean function! Picture in the box below!



2nd Experiment

1. Create a combination of logic gates based on the following karnaugh map.

		AB			
		00	**01**	**11**	**10**
CD	**00**	1	0	0	1
	01	0	1	1	0
	11	0	1	1	0
	10	1	0	0	1

- SOP : I = 0101 II = 0000

1101 1000

0111 0010

1111 1010

BD **B'D'**

- POS : I = 0100 II = 0001

1100 0011

0110 1001

1110 1011

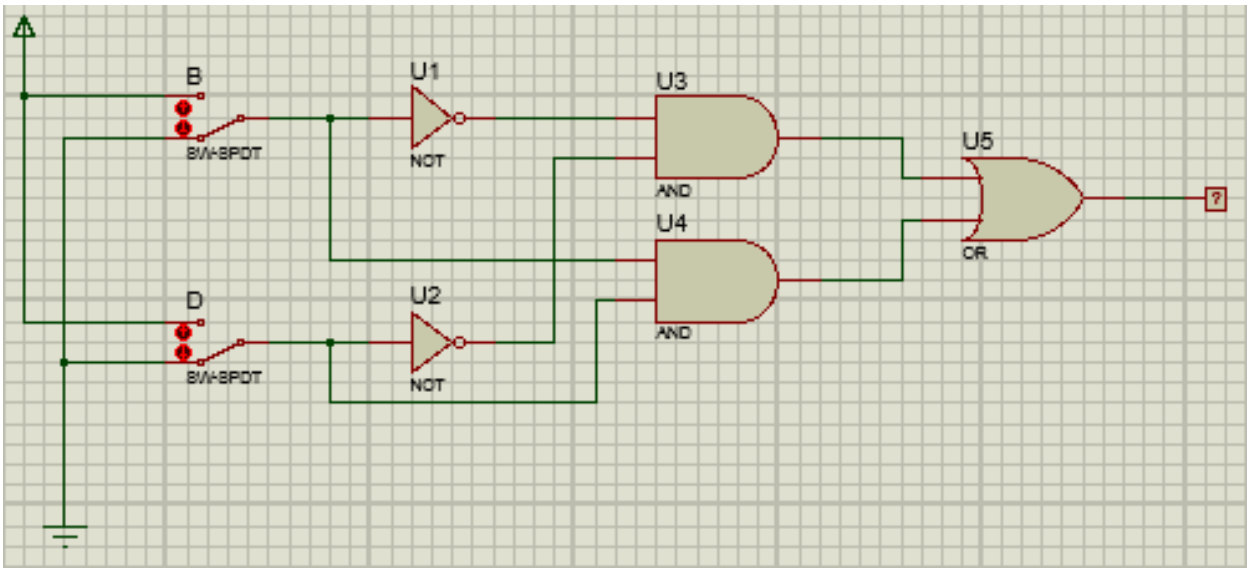
B' + D **B + D'**

2. Boolean function: **F = BD + B'D'** (AND – OR)

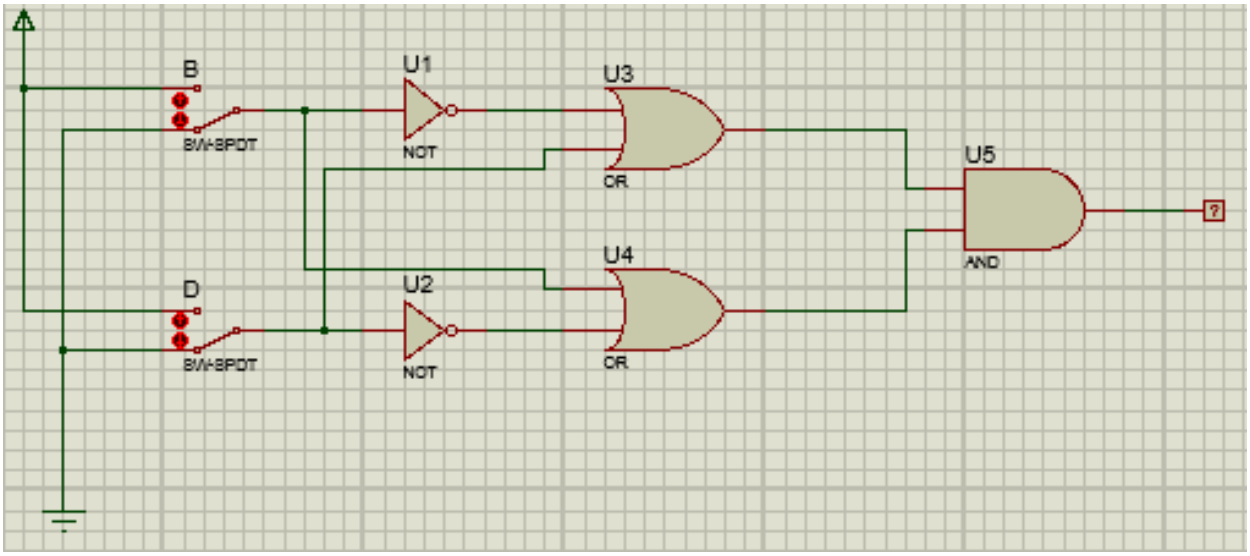
F = (B' + D)(B + D') (OR – AND)

3. Create logic gates based on your boolean function! Picture in the box below!

- SOP



- POS



Do the two combinations give the same results? Yes / No

- SOP : **F = BD + B'D'**
- POS : **F = (B' + D)(B + D')**

= B'B + B'D' + BD + DD'

= 0 + B'D' + BD + 0
= **BD + B'D'**

So, the two combinations give the same results

3rd Experiment

1. Boolean function: **F = XYZ + XYZ' + XY'Z + X'YZ + X'YZ' + XY'Z' + X'Y'Z'**

2. Based on the boolean function, fill in the points on the map because of the following!

		XY			
		00	**01**	**11**	**10**
Z	**0**	1	1	1	1
	1	0	1	1	1

I = 010 II = 110 III = 000

110 100 010

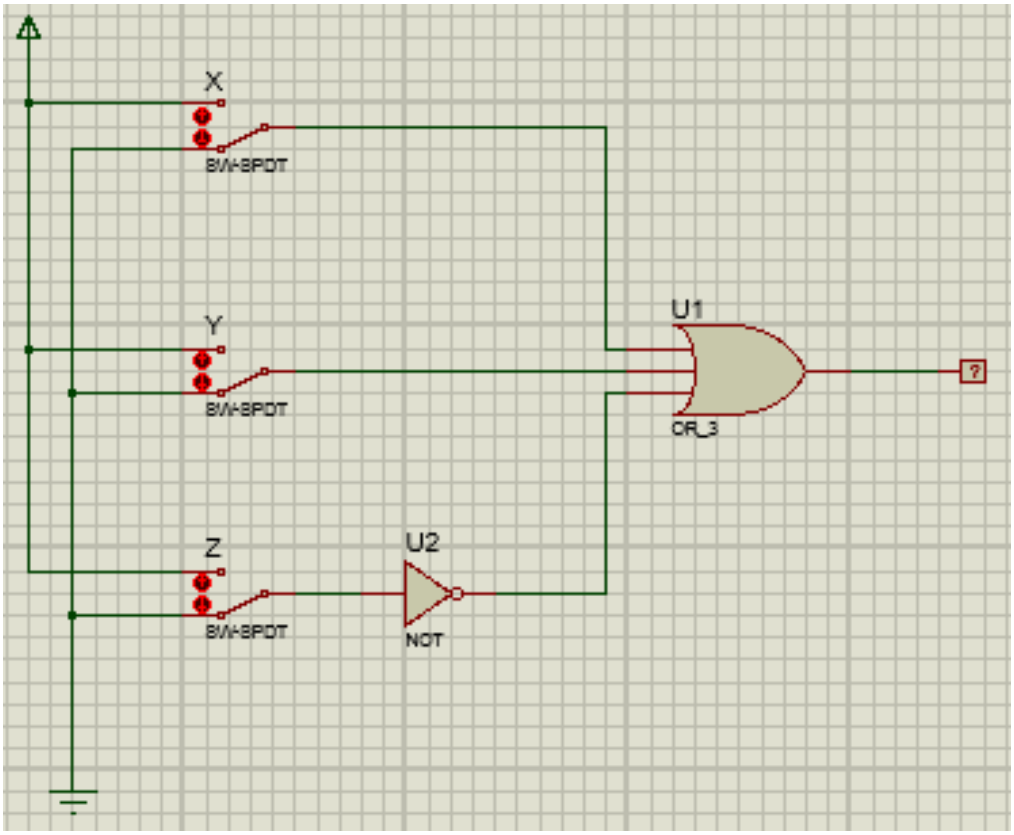
011 111 110

111 101 100

Y **X** **Z'**

3. Simplify boolean functions : **F = X + Y +Z'**

4. Create logic gates based on your boolean function! Picture in the box below!



4th Experiment

1. Boolean function: **F = AD' + ABC + ABC' + BCD + BC'D' + AB'CD'.**

2. Based on the boolean function, fill in the points on the map because of the following!

		AB			
		00	**01**	**11**	**10**
CD	**00**	0	1	1	1
	01	0	0	1	0
	11	0	1	1	0
	10	0	0	1	1

I = 0100 II = 0111 II = 1100 III = 1100

1100 1111 1000 1101

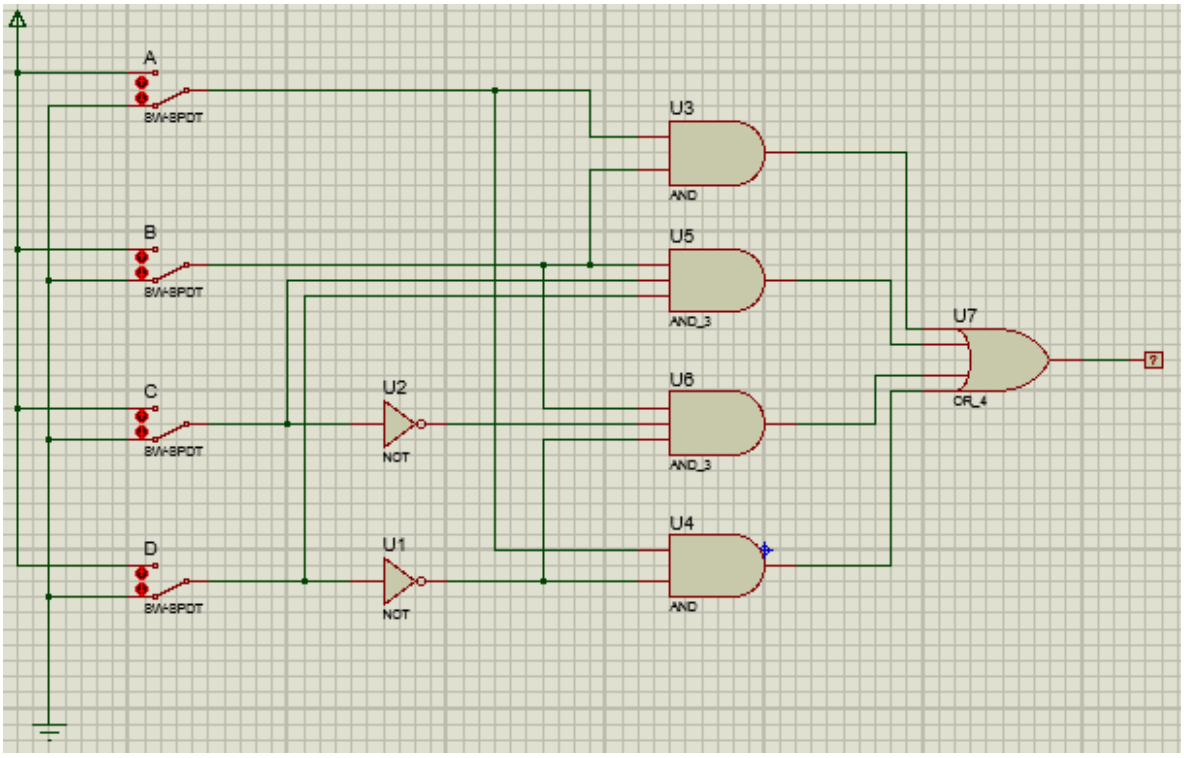
BC'D' **BCD** 1110 1111

1010 1110

AD' **AB**

3. Simplify boolean functions : **F = BC'D' + BCD + AD' + AB**

4. Create logic gates based on your boolean function! Picture in the box below!



5th Experiment

1. Boolean Function Table :

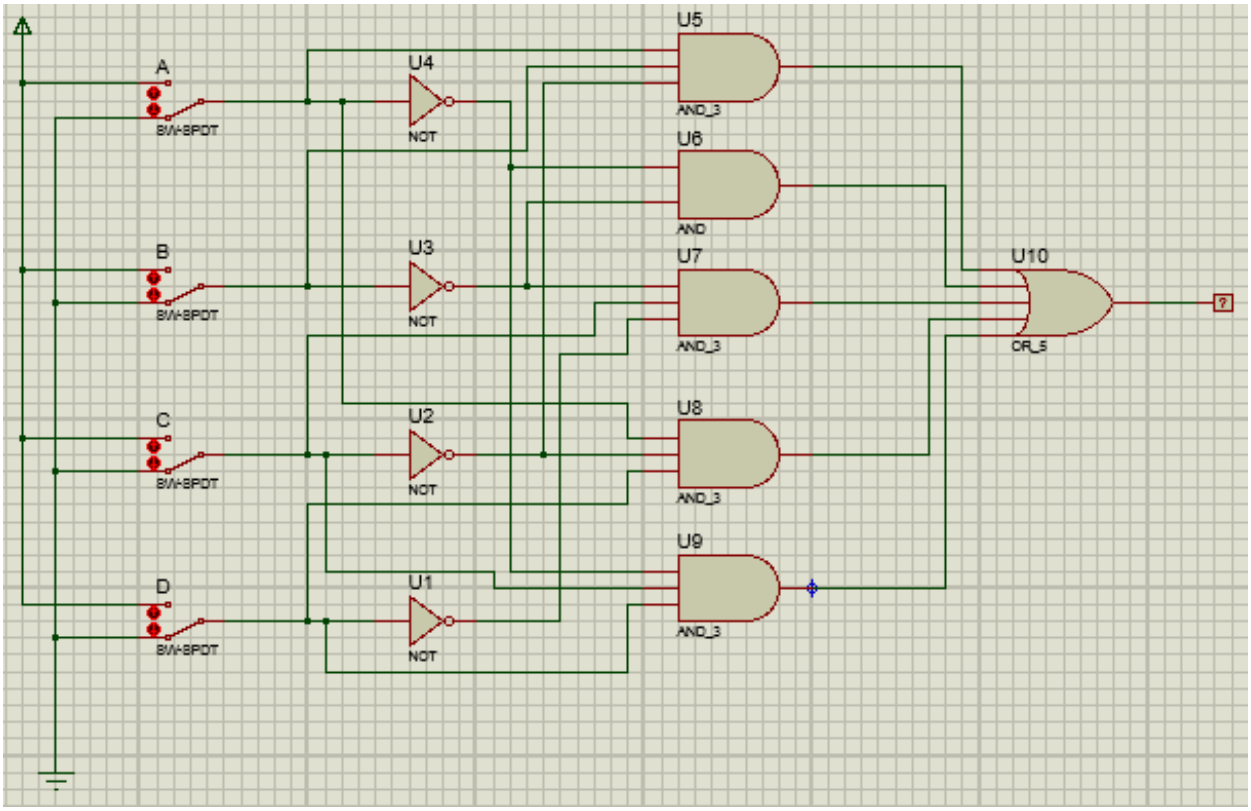
A	B	C	D	**F**
0	0	0	0	**1**
1	0	0	0	0
0	1	0	0	0
1	1	0	0	**1**
0	0	1	0	**1**
1	0	1	0	**1**
0	1	1	0	0
1	1	1	0	0
0	0	0	1	**1**
1	0	0	1	**1**
0	1	0	1	0
1	1	0	1	**1**
0	0	1	1	**1**
1	0	1	1	0
0	1	1	1	**1**
1	1	1	1	0

2. Based on the boolean function, fill in the points on the map because of the following!

		AB			
		00	**01**	**11**	**10**
CD	**00**	1	0	1	0
	01	1	0	1	1
	11	1	1	0	0
	10	1	0	0	1

I = 0000	II = 0011	III = 0010	IV = 1101	V = 1100
0001	0111	1010	1001	1101
0011	**A'CD**	**B'CD'**	**AC'D**	**ABC'**
0010				
A'B'				

3. Simple boolean function : **F = A'B' + A'CD + B'CD' + AC'D + ABC'**
4. Create logic gates based on your boolean function! Picture in the box below!



Do the two combinations give the same results? Yes / No