

**DIGITAL SYSTEMS**

**PRACTICUM 6**



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## Experiment 1

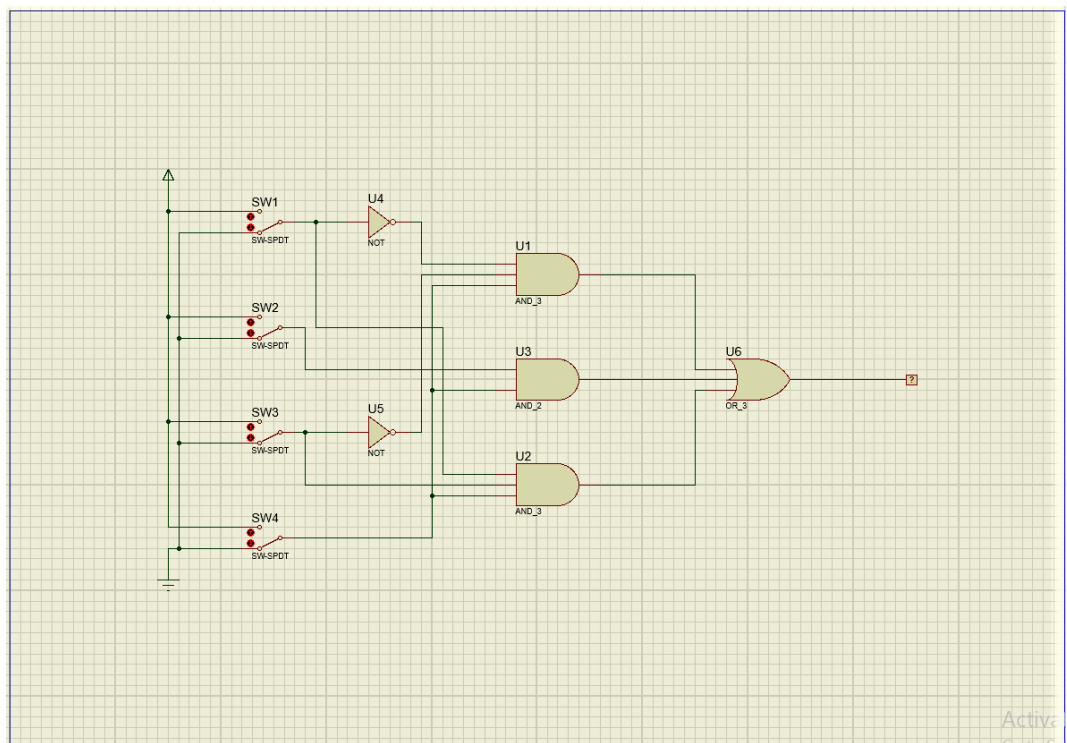
### 1. Karnaugh map

		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

### 2. Boolean function

$$F = \bar{A}\bar{C}D + BD + ACD$$

### 3. Logic gate combination



Picture 1.1. Logic gate based on boolean function

## Experiment 2

### 1. Karnaugh map

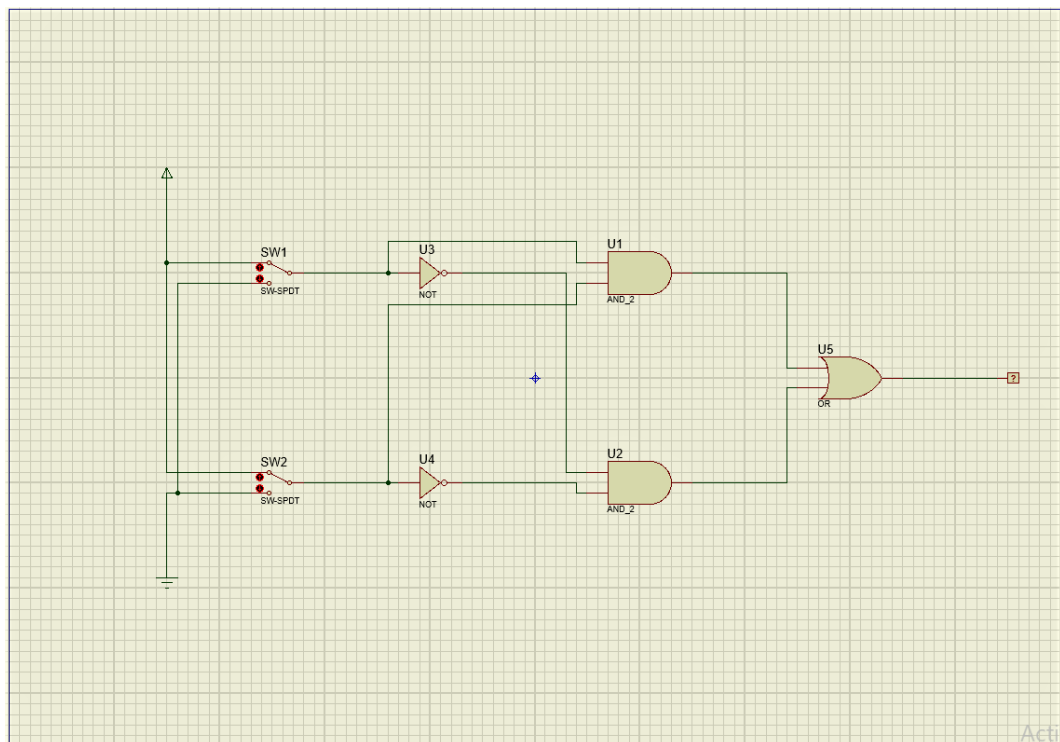
		AB			
		00	01	11	10
CD	00	1	0	0	1
	01	0	1	1	0
	11	0	1	1	0
	10	1	0	0	1

### 2. Boolean Function

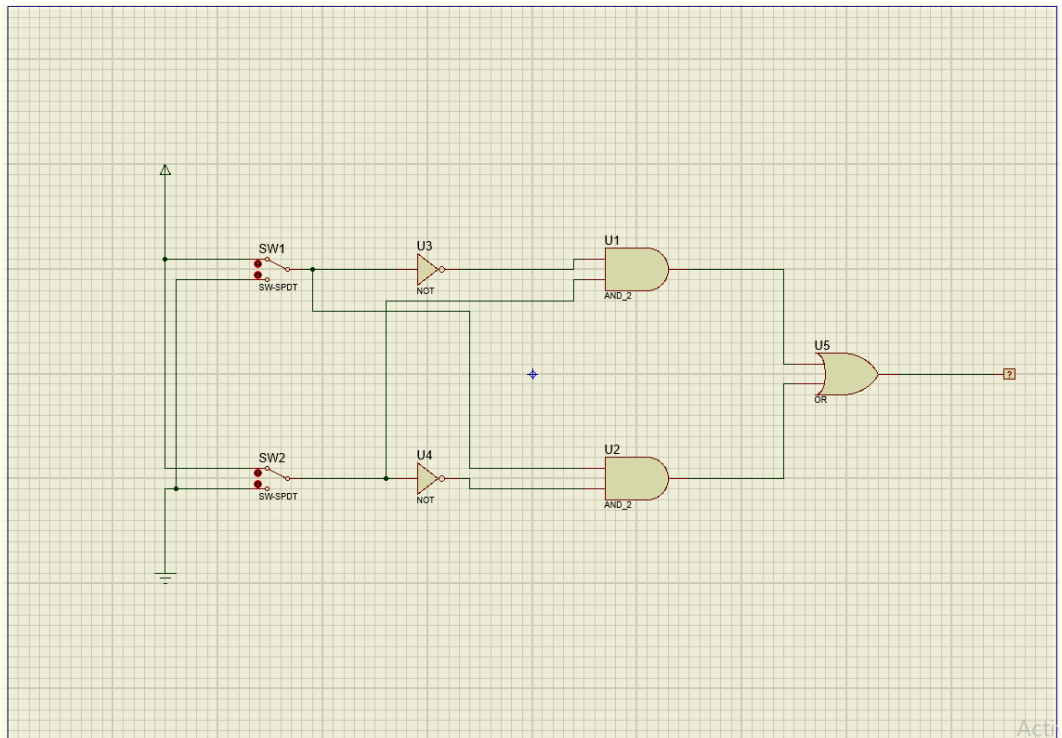
a.  $F = \bar{B}\bar{D} + BD$  (AND-OR)

b.  $F = B\bar{D} + \bar{B}D$  (OR-AND)

### 3. Logic gate combination



Picture 2.1. Logic gate based on boolean function (AND-OR)



Picture 2.2. Logic gate based on boolean function (OR-AND)

### Experiment 3

#### 1. Boolean Function

$$F = XYZ + XY\bar{Z} + X\bar{Y}Z + \bar{X}YZ + \bar{X}Y\bar{Z} + X\bar{Y}\bar{Z} + \bar{X}\bar{Y}\bar{Z}$$

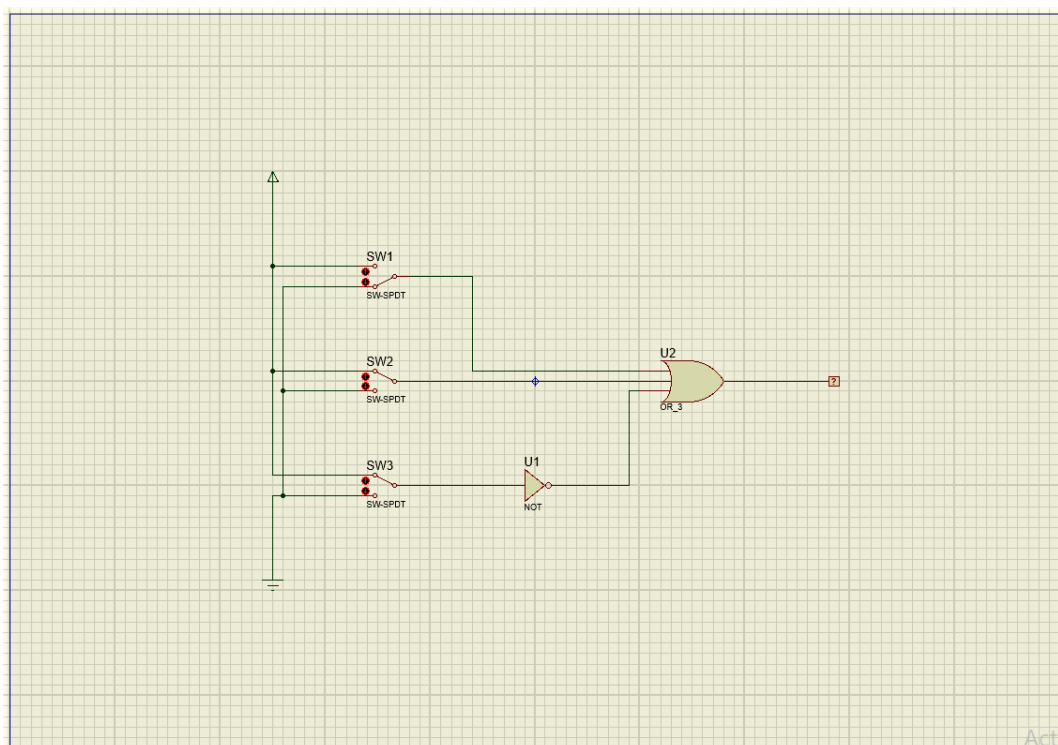
#### 2. Karnaugh map

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

#### 3. Simplification of boolean function

$$F = X + Y + \bar{Z}$$

#### 4. Logic gate combination



Picture 3.1. Logic gate based on simplification of boolean function

## Experiment 4

### 1. Boolean function

$$F = A\bar{D} + ABC + AB\bar{C} + BCD + B\bar{C}\bar{D} + A\bar{B}C\bar{D}$$

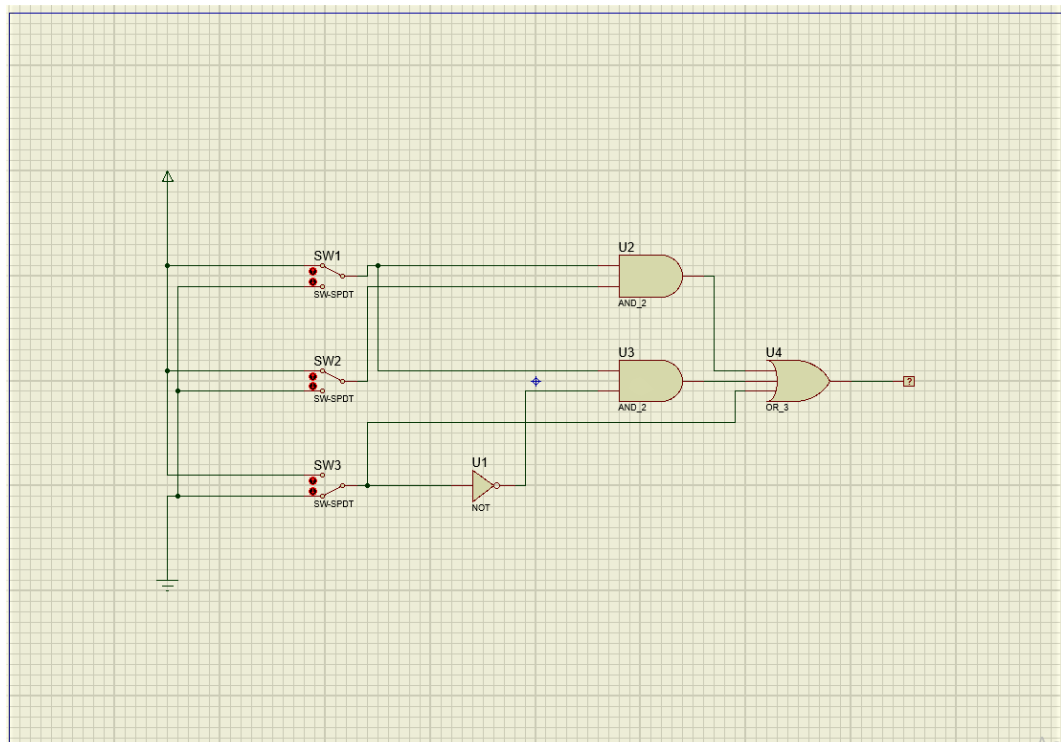
### 2. Karnaugh map

		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

### 3. Simplification of boolean function

$$F = AB + A\bar{D} + B$$

### 4. Logic gate combination



Picture 4.1. Logic gate based on simplification of boolean function

## Experiment 5

### 1. Table of boolean function

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>F</b>
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

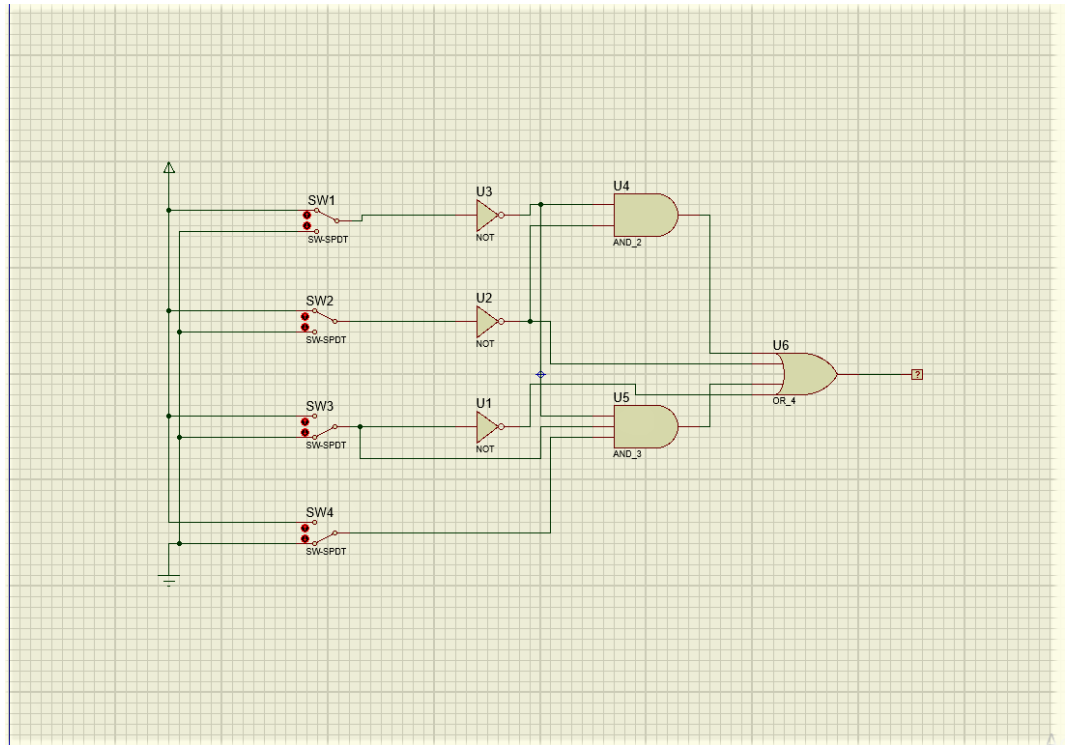
### 2. Karnaugh Map

		<b>AB</b>			
		<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>CD</b>	<b>00</b>	1	0	1	0
	<b>01</b>	1	0	1	1
	<b>11</b>	1	1	0	0
	<b>10</b>	1	0	0	1

### 3. Simplification of boolean function

$$F = \bar{A}\bar{B} + \bar{B} + \bar{A}CD + \bar{C}$$

#### 4. Logic gate combination



Picture 5.1. Logic gate based on simplification of boolean function