

**DIGITAL SYSTEM**

**PRACTICUM 6**



**By:**

**LUCKYTA AFIA SUSANTO**

**NIM: L200183103**

**INFORMATION TECHNOLOGY**

**FACULTY OF COMMUNICATION AND INFORMATICS**

**UNIVERSITY OF MUHAMMADIYAH SURAKARTA**

## Task 1

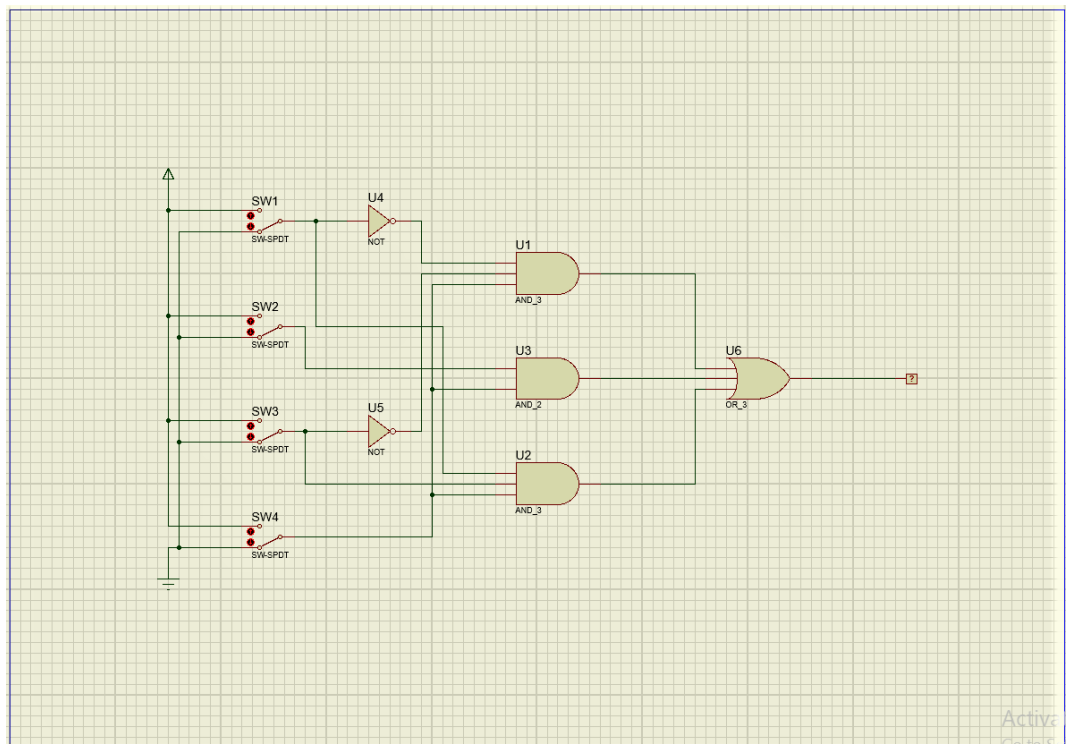
### 1. Karnaugh map

		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

$$F = A'C'D + BD + ACD$$

### 3. Logic gate combination



Picture 1.1. Logic gate combination based on boolean function

## Task 2

### 1. Karnaugh map

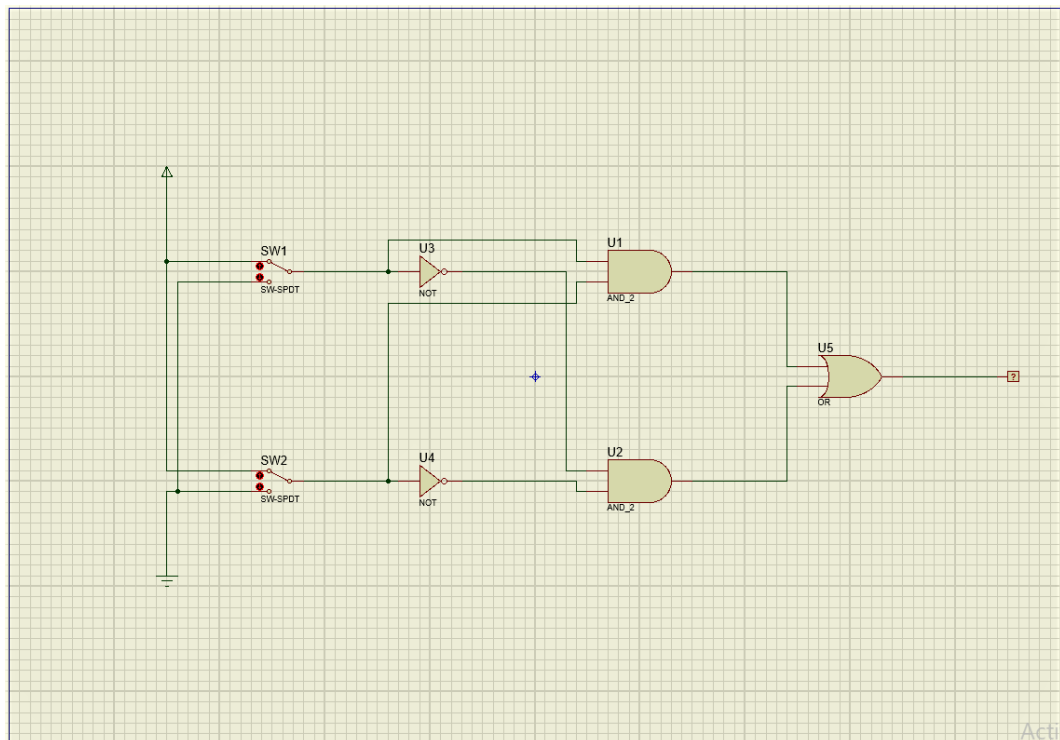
		AB			
		00	01	11	10
CD	00	1	0	0	1
	01	0	1	1	0
	11	0	1	1	0
	10	1	0	0	1

### 2. Boolean Function

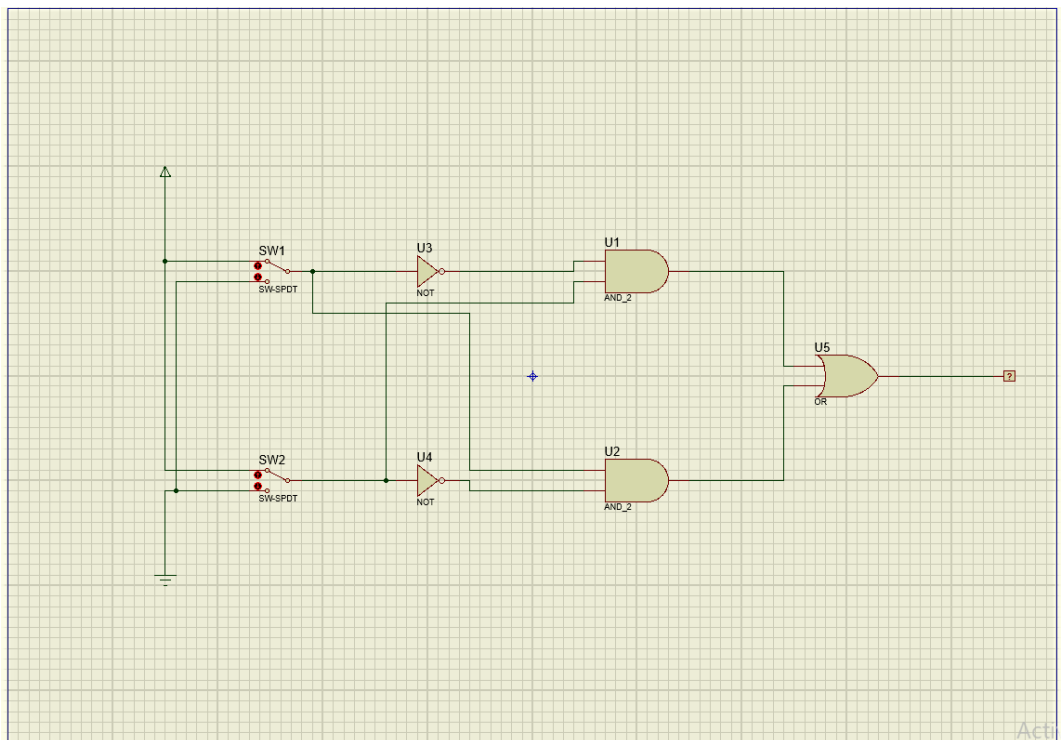
a.  $F = BD + B'D'$  (AND-OR)

b.  $F = B'D + BD'$  (OR-AND)

### 3. Logic gate combination



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



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

### Task 3

#### 1. Boolean Function

$$F = XYZ + XYZ' + XY'Z + X'YZ + X'YZ' + XY'Z' + X'Y'Z'$$

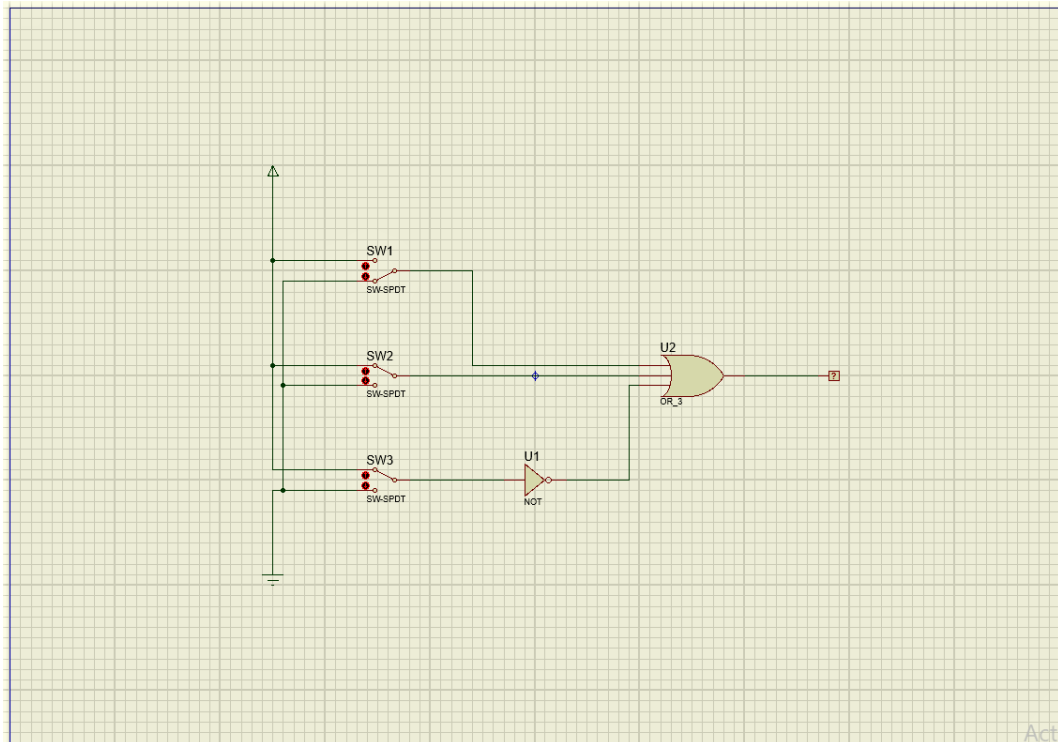
#### 2. Karnaugh map

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

#### 3. Simplification of boolean function

$$F = Z' + Y + X$$

#### 4. Logic gate combination



Picture 3.1. Logic gate combination based on simplification of boolean function

## Task 4

1. Boolean function

$$F = AD' + ABC + ABC' + BCD + BC'D' + AB'CD'$$

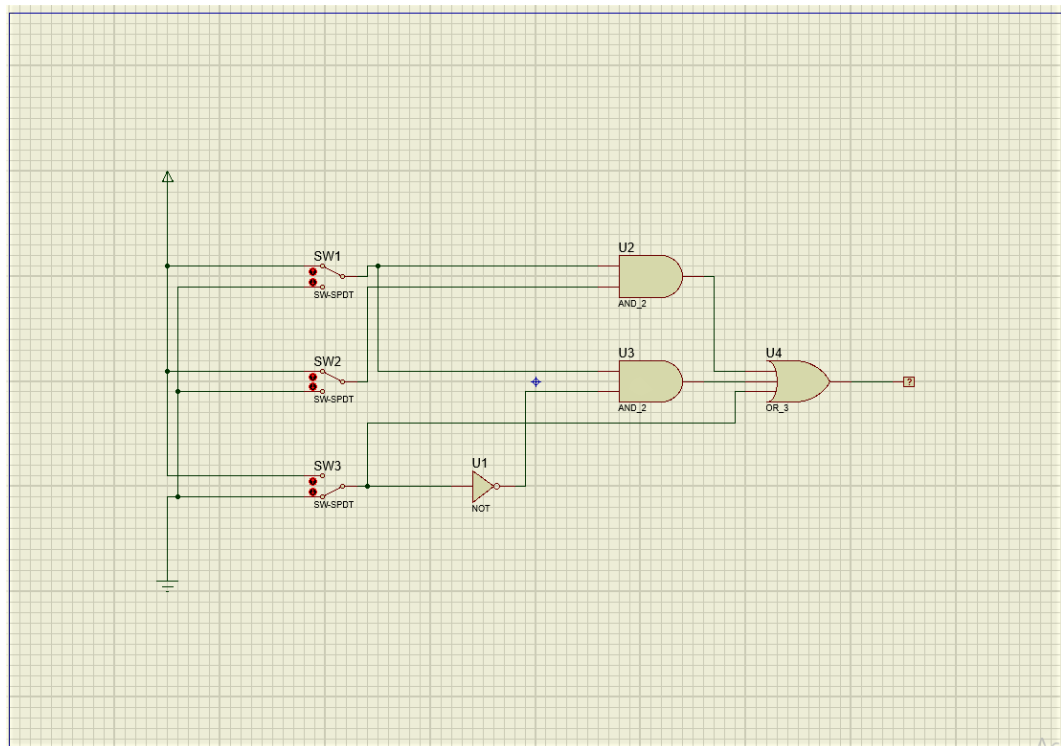
2. Karnaugh map

		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

$$F = AB + AD' + B$$

4. Logic gate combination



Picture 4.1. Logic gate combination based on simplification of boolean function

## Task 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

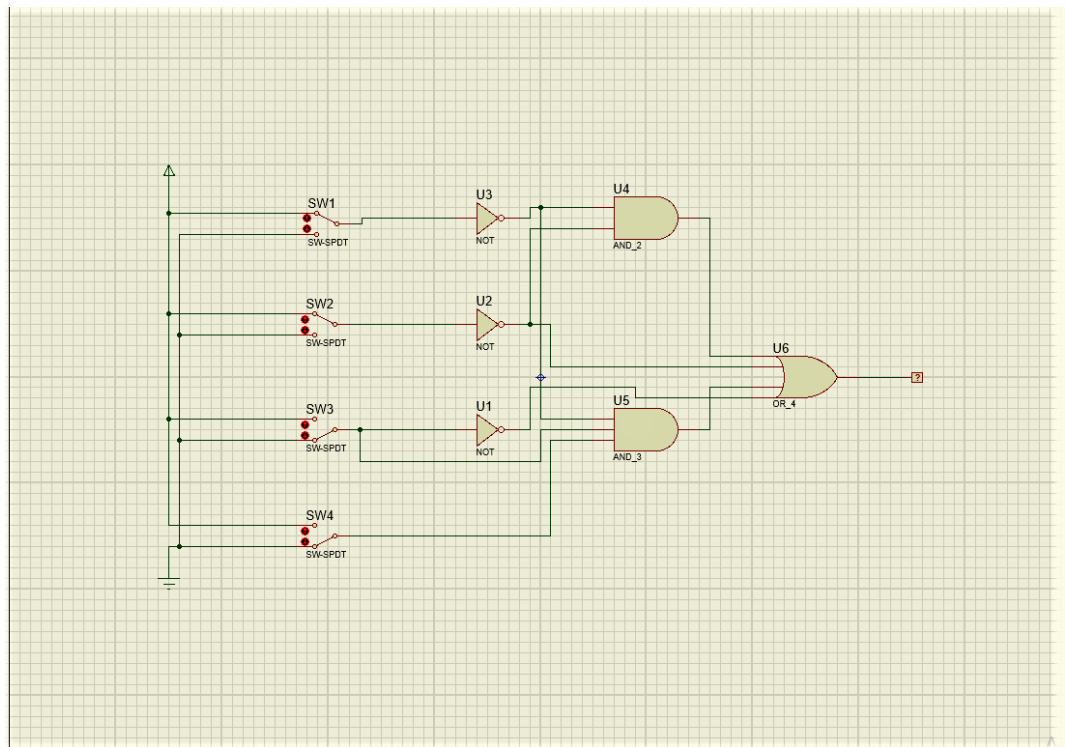
### 2. Karnaugh Map

		<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

$$F = A'B' + B' + A'CD + C'$$

### 4. Logic gate combination



Picture 5.1. Logic gate combination based on simplification of boolean function