

DIGITAL SYSTEMS

PRACTICUM 6



By:

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Experiment 1

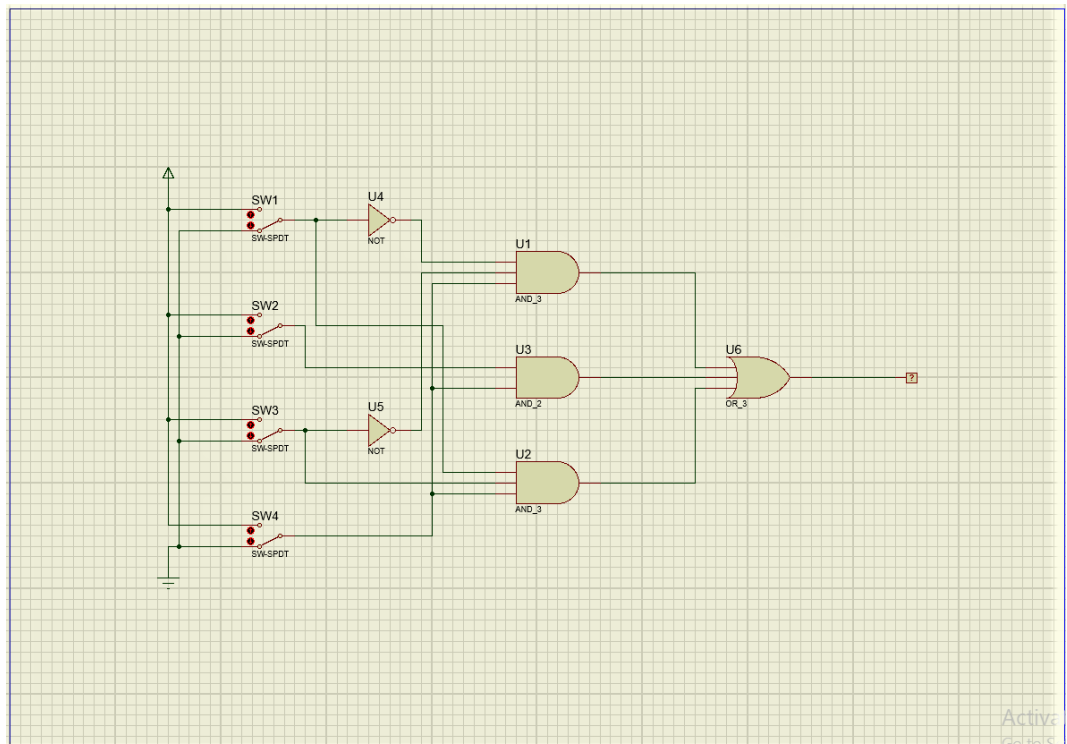
1. Karnaugh map

| | | 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

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

3. Logic gate combination



Picture 1.1. Logic gate combination based on boolean function

Experiment 2

1. Karnaugh map

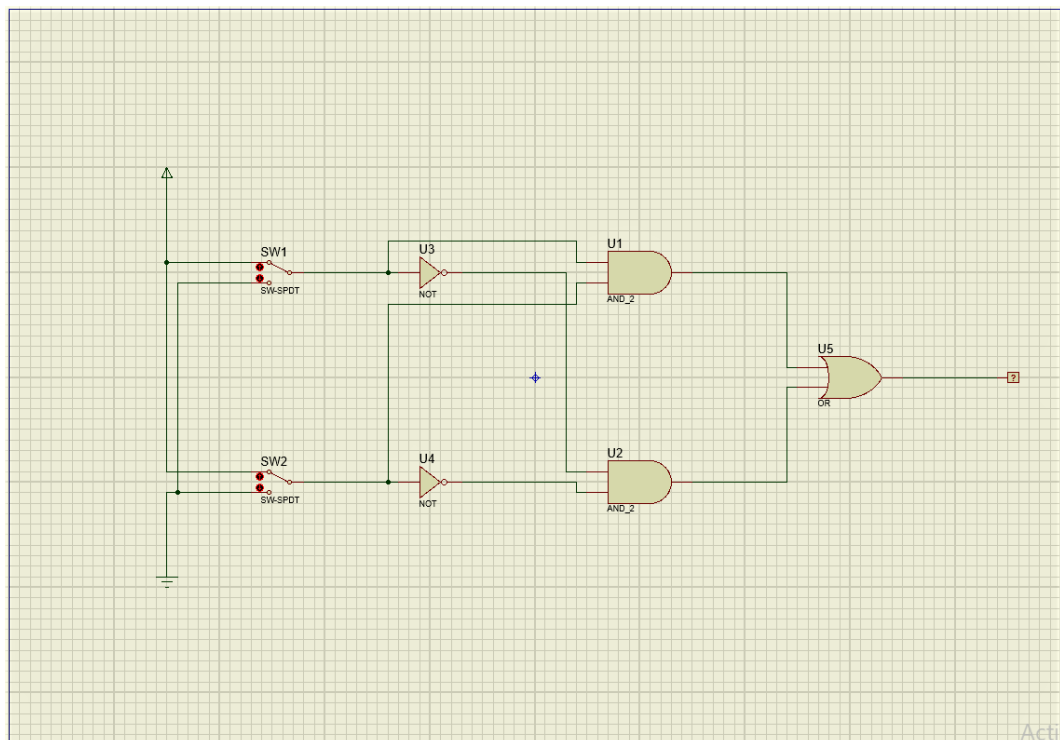
| | | AB | | | |
|----|----|----|----|----|----|
| | | 00 | 01 | 11 | 10 |
| CD | 00 | 1 | 0 | 0 | 1 |
| | 01 | 0 | 1 | 1 | 0 |
| | 11 | 0 | 1 | 1 | 0 |
| | 10 | 1 | 0 | 0 | 1 |

2. Boolean Function

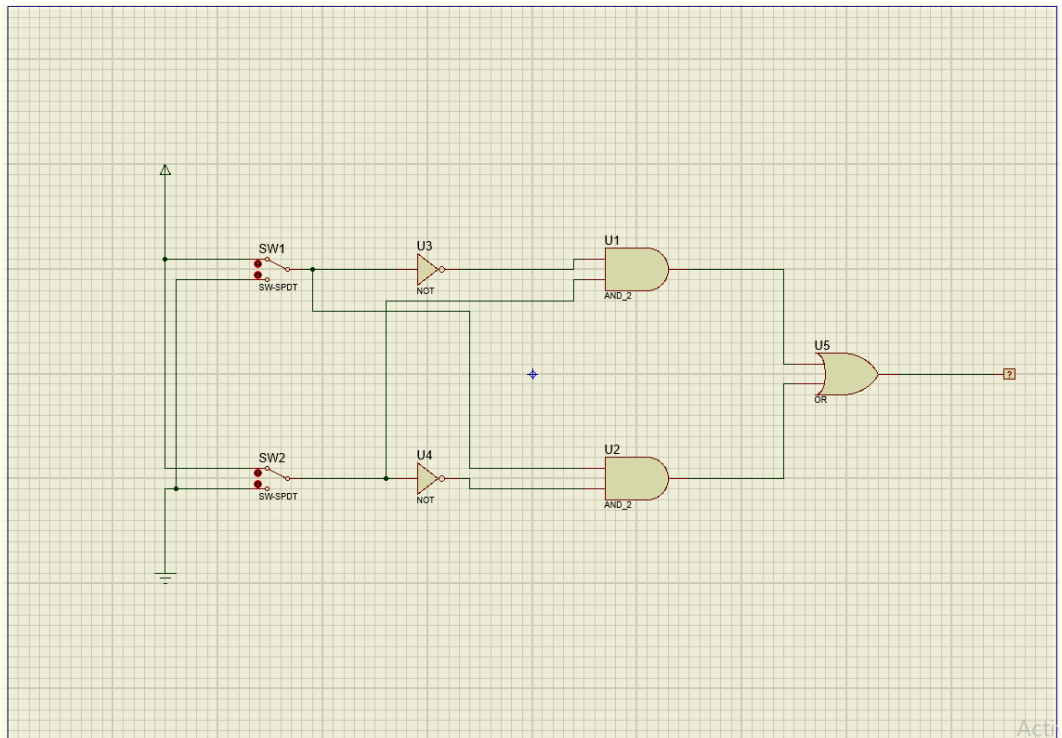
a. $F = BD + B'D'$ (AND-OR)

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)

Experiment 3

1. Boolean Function

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

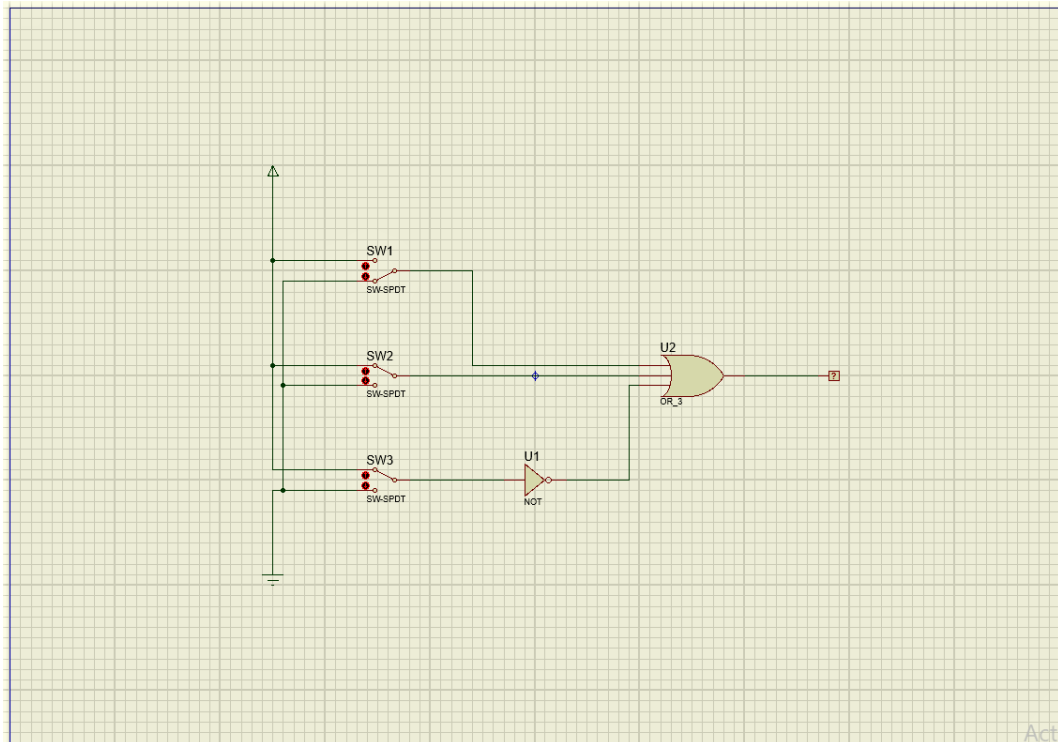
2. Karnaugh map

| | | 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

Experiment 4

1. Boolean function

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

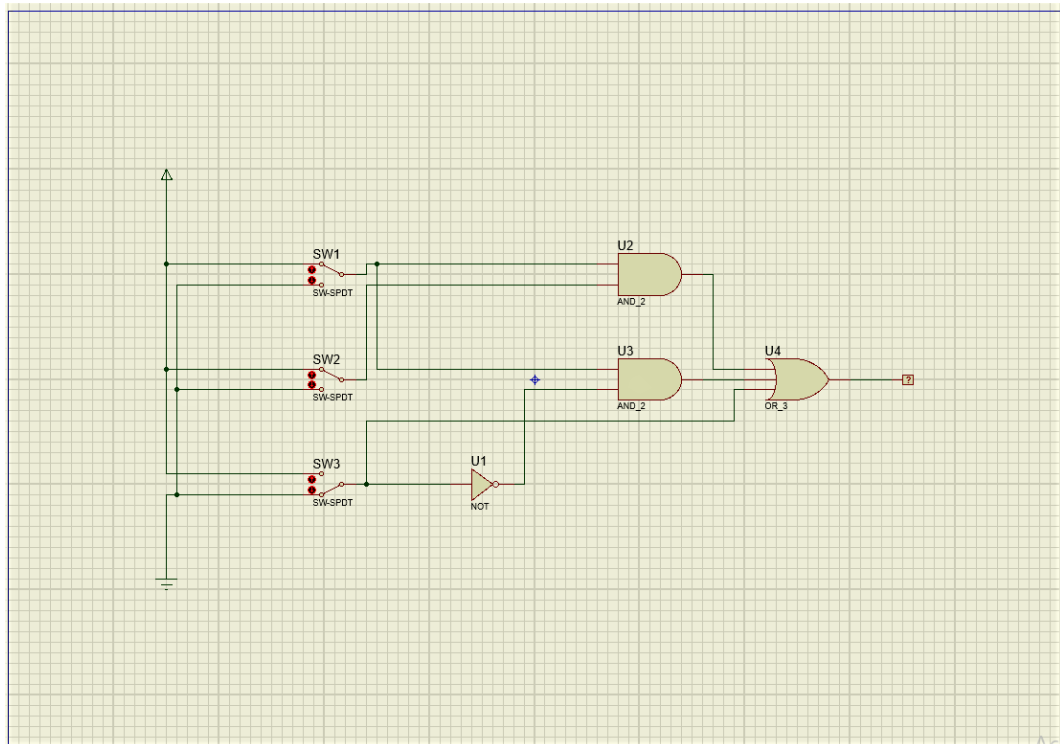
2. Karnaugh map

| | | 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

Experiment 5

1. Table of boolean function

| 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 |

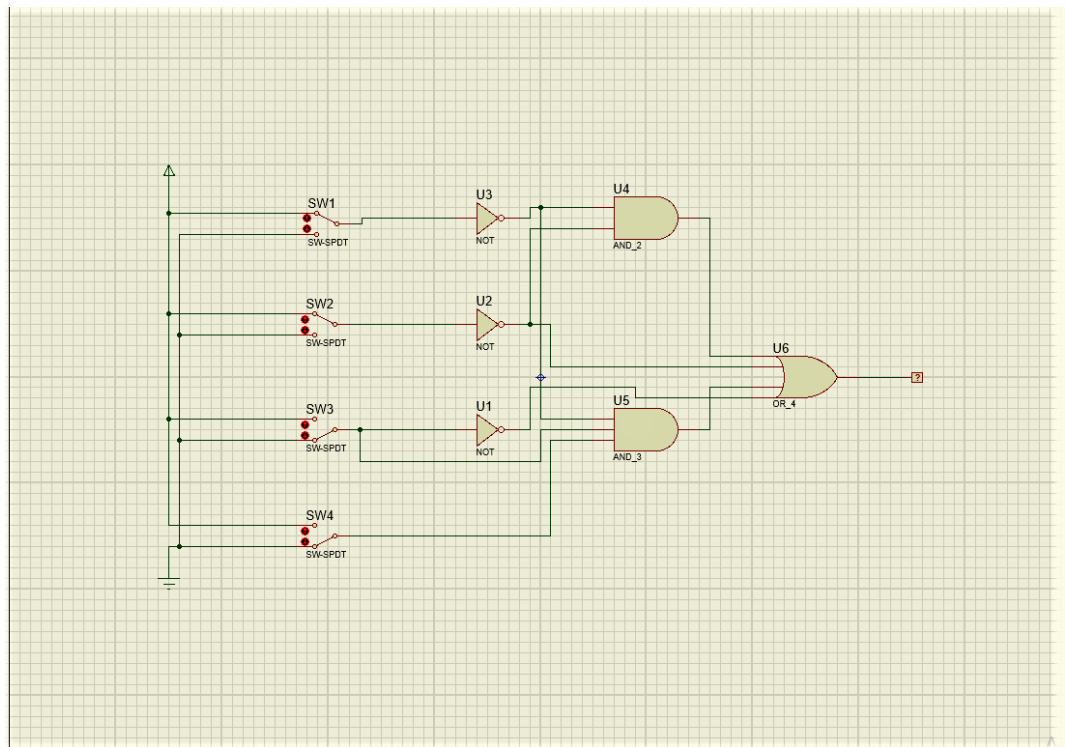
2. Karnaugh Map

| | | 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 |

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