CS310 – Project

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COMPUTER SCIENCE 310 – Computer Architecture

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Truth Table:

A	B	C	D	E		Q	R	S	T	U	V	W	X
0	0	0	0	0		0	0	0	0	0	1	1	1
0	0	0	0	1		0	0	1	1	0	1	1	1
0	0	0	1	0		0	0	0	1	0	0	1	0
0	0	0	1	1		0	0	1	0	0	0	1	0
0	0	1	0	0		0	0	1	1	0	1	1	0
0	0	1	0	1		0	1	0	1	0	1	1	0
0	0	1	1	0		0	0	1	0	0	0	1	1
0	0	1	1	1		0	1	1	0	0	0	1	1
0	1	0	0	0		0	1	1	0	0	1	1	0
0	1	0	0	1		0	1	1	1	0	1	1	0
0	1	0	1	0		0	1	1	1	0	0	0	0
0	1	0	1	1		1	0	0	0	0	0	0	0
0	1	1	0	0		0	1	0	1	0	1	0	1
0	1	1	0	1		1	0	0	1	0	1	0	1
0	1	1	1	0		0	1	0	0	0	0	0	0
0	1	1	1	1		1	0	1	0	0	0	0	0
1	0	0	0	0		1	1	0	0	0	1	0	0
1	0	0	0	1		1	0	1	1	0	1	0	0
1	0	0	1	0		1	1	0	1	0	0	0	1
1	0	0	1	1		1	1	0	0	0	0	0	1
1	0	1	0	0		X	X	X	X	1	X	X	X
1	0	1	0	1		X	X	X	X	1	X	X	X
1	0	1	1	0		X	X	X	X	1	X	X	X
1	0	1	1	1		X	X	X	X	1	X	X	X
1	1	0	0	0		X	X	X	X	1	X	X	X
1	1	0	0	1		X	X	X	X	1	X	X	X
1	1	0	1	0		X	X	X	X	1	X	X	X
1	1	0	1	1		X	X	X	X	1	X	X	X
1	1	1	0	0		X	X	X	X	1	X	X	X
1	1	1	0	1		X	X	X	X	1	X	X	X
1	1	1	1	0		X	X	X	X	1	X	X	X
1	1	1	1	1		X	X	X	X	1	X	X	X

Q – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	1	1	0
10	0	0	1	0

A

BC/DE	00	01	11	10
00	1	1	1	1
01	X-1	X-1	X-1	X-1
11	X-1	X-1	X-1	X-1
10	X-1	X-1	X-1	X-1

Equation:

$$Q = A + BDE + BCE$$

$$Q = A + B\,E\,(\,D + C\,)$$

R – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	0	0	1	0
01	0	1	1	0
11	1	0	0	1
10	1	1	0	1

A

BC/DE	00	01	11	10
00	1	0	1	1
01	X-1	X-1	X-1	X-1
11	X-1	X-0	X-0	X-1
10	X-1	X-1	X-0	X-1

Equation:

$$R = \ B\,\overline{E} + A\,\overline{E} + \overline{B}\,D\,E + \overline{B}\,C\,E + B\,\overline{C}\,\overline{D}$$

$$R = \overline{E}\,(\,B + A\,) + \overline{B}\,E\,(\,D + C\,) + B\,\overline{C}\,\overline{D}$$

S – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	0	1	0	0
01	1	0	1	1
11	0	0	1	0
10	1	1	0	1

A

BC/DE	00	01	11	10
00	0	1	0	0
01	X-1	X-0	X-1	X-1
11	X-0	X-0	X-1	X-0
10	X-1	X-1	X-0	X-1

Equation:

$$S = \overline{C}\,\overline{D}\,E + \overline{B}\,C\,\overline{E} + C\,D\,E + B\,\overline{C}\,\overline{E}$$

$$S = E\,(\overline{C}\,\overline{D} + CD) + \overline{E}(\overline{B}\,C + B\,\overline{C})$$

T – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	0	1	0	1
01	1	1	0	0
11	1	1	0	0
10	0	1	0	1

A

BC/DE	00	01	11	10
00	0	1	0	1
01	X-1	X-1	X-0	X-0
11	X-1	X-1	X-0	X-0
10	X-0	X-1	X-0	X-1

Equation:

$$T = \overline{D}\,E + C\,\overline{D} + \overline{C}\,D\,\overline{E}$$

$$T = \overline{D}\,(E + C) + \overline{C}\,D\,\overline{E}$$

U – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	0
10	0	0	0	0

A

BC/DE	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

Equation:

$$U = AC + AB$$

$$U = A\,(\,C + B\,)$$

V – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	1	1	0	0
10	1	1	0	0

A

BC/DE	00	01	11	10
00	1	1	0	0
01	X-1	X-1	X-0	X-0
11	X-1	X-1	X-0	X-0
10	X-1	X-1	X-0	X-0

Equation:

$$V = \overline{D}$$

W – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	0	0	0	0
10	1	1	0	0

A

BC/DE	00	01	11	10
00	0	0	0	0
01	X-0	X-0	X-0	X-0
11	X-0	X-0	X-0	X-0
10	X-0	X-0	X-0	X-0

Equation:

$$W = \overline{A}\,\overline{B} + \overline{A}\,\overline{C}\,\overline{D}$$

$$W = \overline{A}\,(\,\overline{B} + \overline{C}\,\overline{D}\,)$$

X – K-Map

$\overline{A}$

BC/DE	00	01	11	10
00	1	1	0	0
01	0	0	1	1
11	1	1	0	0
10	0	0	0	0

A

BC/DE	00	01	11	10
00	0	0	1	1
01	X-0	X-0	X-1	X-1
11	X-1	X-1	X-1	X-1
10	X-0	X-0	X-1	X-1

Equation:

$$X = A\,D + \overline{B}\,C\,D + B\,C\,\overline{D} + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D}$$

$$X = A\,D + C\,(\,\overline{B}\,D + B\,\overline{D}\,) + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D}$$