

ECE 275 Exam 1 Answer Key

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1.)

X

C

A

B

D

Y

C

A

B

D

Z

C

A

B

D

	A	B	C	D	X	Y	Z
0	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0
2	0	0	1	0	0	0	0
3	0	0	1	1	0	0	0
4	0	1	0	0	0	0	1
5	0	1	0	1	0	0	1
6	0	1	1	0	1	0	0
7	0	1	1	1	0	0	1
8	1	0	0	0	0	0	1
9	1	0	0	1	0	0	1
10	1	0	1	0	0	0	1
11	1	0	1	1	0	0	1
12	1	1	0	0	0	0	1
13	1	1	0	1	0	0	1
14	1	1	1	0	0	0	1
15	1	1	1	1	0	1	0

$$X = \bar{A}BC\bar{D} = (A + \bar{B} + \bar{C} + D)$$

$$Y = ABCD = (\bar{A} + \bar{B} + \bar{C} + \bar{D})$$

$$Z = A\bar{B} + A\bar{D} + ABD + BC = \cancel{(A + \bar{B})}(\cancel{\bar{A} + D})(\cancel{A + B})\bar{D} + (B + C)$$

Col 1

Col 2

Group	M	Binary
1	4	0100
	8	1000
	5	0101
2	9	1001
	10	1010
	12	1100
3	7	0111
	11	1011
	13	1101
	14	1110

Group	M	Binary
1	4, 5	010-
	4, 12	-100
	8, 9	100-
	8, 10	10-0
	8, 12	1-00
2	5, 7	01-1
	5, 13	-101
	9, 11	10-1
	9, 13	1-01
	10, 11	101-
	10, 14	1-10
	12, 13	110-
	12, 14	11-0

Col 3

Group	M	Binary
1	4, 5, 12, 13	-10-
	8, 9, 10, 11	10--
	5, 7	01-1
	8, 10, 12, 14	1--0

ABCD

$$Z = \overline{B}\overline{C} + A\overline{B} + A\overline{D} + \overline{A}BD$$

$$\#3) \quad B\bar{C} + A\bar{B} + A\bar{D} + \bar{A}BD$$

$$\begin{array}{cccc} 3 & 3 & 3 & 3 \end{array}$$

$$\begin{array}{cccc} 1 & 1 & 111 & 111 \\ & & 1 & 1 \end{array}$$

Doesn't lower cost of 22

Z is not hazard free

4.)

		A			
	0	1	1	1	
	0	1	1	1	
C	0	1	0	1	D
	0	0	1	1	
		B			

$$Z = \overline{B}\overline{C} + \overline{A}D + A\overline{B} + \overline{A}BD + A\overline{D}$$