Design an excess-3 code to BCD converter

We know that, excess-3 code begins with the binary 0011(decimal 3) and it will continue up to binary 1100(decimal 12) where I get the output binary 1001(decimal 9) for input binary 1100(decimal 12). So I need 4 variables as inputs and 4 variables as outputs. With 4 variables I can represent 16 binary values from 0000 to 1111. Since I do not use 0, 1, 2, 13, 14, 15 as inputs, when I simplify the output function I use those terms as don't care conditions.

Truth Table :

Inputs				Outputs			
W	X	Y	Z	A	B	C	D
0	0	1	1	0	0	0	0
0	1	0	0	0	0	0	1
0	1	0	1	0	0	1	0
0	1	1	0	0	0	1	1
0	1	1	1	0	1	0	0
1	0	0	0	0	1	0	1
1	0	0	1	0	1	1	0
1	0	1	0	0	1	1	1
1	0	1	1	1	0	0	0
1	1	0	0	1	0	0	1

MAP :

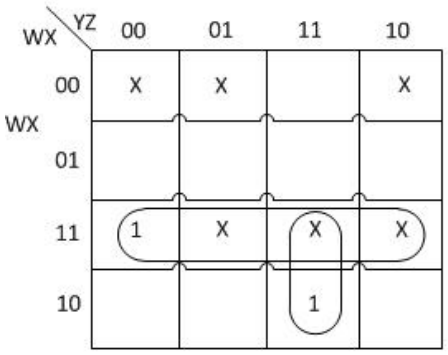

Fig: Map for A

$$A = WX + WYZ$$

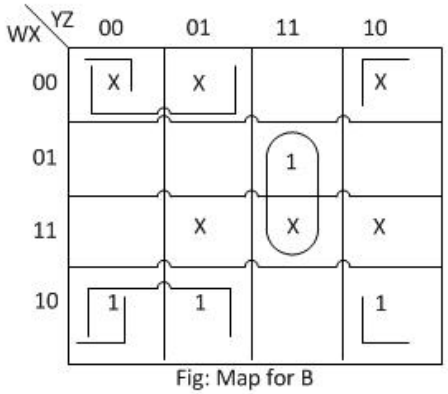

Fig: Map for B

$$B = XY' + XYZ + XZ'$$

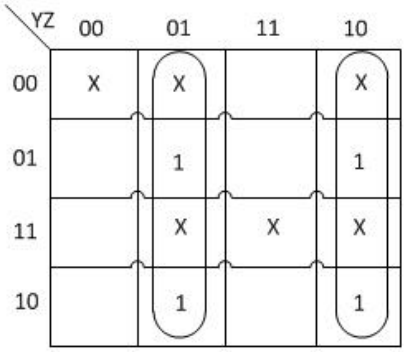

Fig: Map for C

$$C = Y'Z + YZ'$$

OR

$$C = Y \oplus Z$$

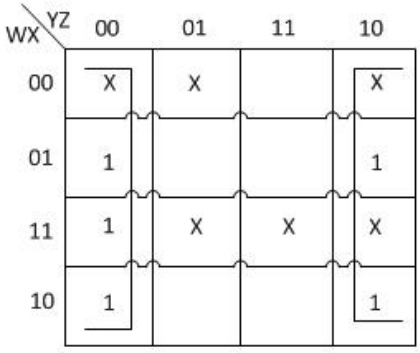

Fig: Map for D

$$D = Z'$$