EE 5811 : FPGA LAB ASSIGNMENT 1

ANNU (EE21RESCH01010)

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1 PROBLEM STATEMENT-ICSE 2017-5(A)

A school intends to select to select candidates for an inter-School Eassy competition as per the criteria given below:

- The student has participated in an earlier competition and is very creative.
  OR
- The student is very creative and has excellent awareness,but has not participated in any competition earlier.
  OR
- The student has excellent general awareness and has won prize in an inter house competition.

The inputs are

- **A:** Participated in a competition earlier.
- **B:** is very creative.
- **C:** Won prize in an inter house competition.
- **D:** has excellent general awareness.

In all the above cases,1 indicates YES and 0 indicates NO .

OUTPUT: X [1 indicates YES and 0 indicates NO] .

Draw the truth table for the inputs nd outputs given above and write POS expressions for it

2 SOLUTION

From the truth table 2.1, maxterms are:-

$$X(A, B, C, D) = \prod(0, 1, 2, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15) \quad (1)$$

Using K-Map 2.1, simplified POS expression is:

$$X = (A + D)(\bar{A} + B)(\bar{B} + \bar{C})(A + B + C)(A + C + \bar{D}) \quad (2)$$

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

TABLE 2.1: Truth Table

Fig. 2.1: Karnaugh-Map

2.1 Using Nand Logic:

$$X = (A + D)(\bar{A} + B)(\bar{B} + \bar{C})(A + B + C)(A + C + \bar{D})$$
$$(3)$$
$$= (\bar{A}\bar{D})'(A\bar{B})'(BC)'(\bar{A}\bar{B}\bar{C})'(\bar{A}\bar{C}D)' \qquad (4)$$
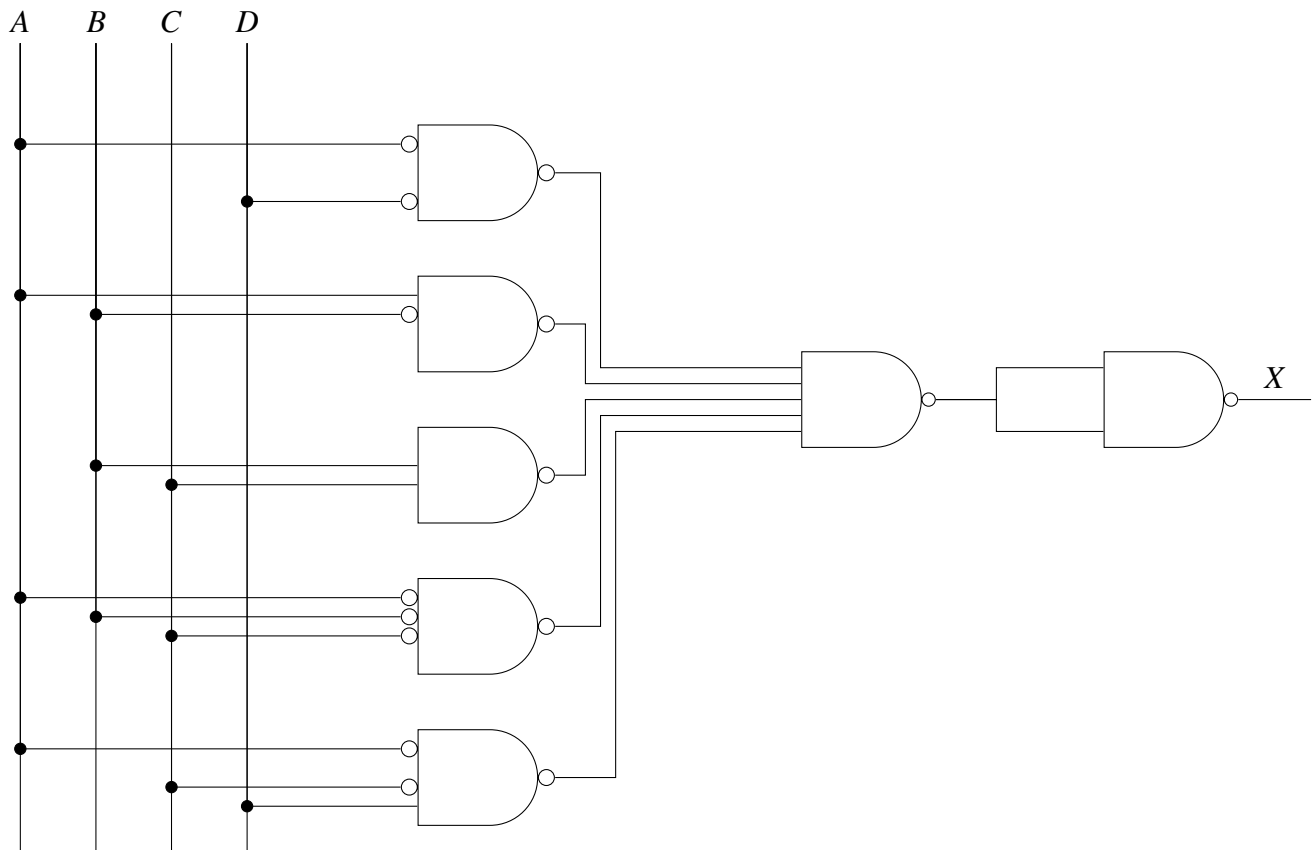$$(5)$$

Now we can draw the logic circuit using NAND gates as below.

Fig. 2.2: Logic Circuit using NAND gates