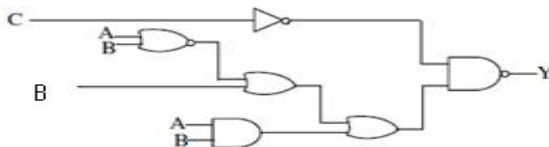


DIGITAL ELECTRONICS (14B11EC317)

Tutorial-4

Q1 In the circuit shown in the figure, if $C=0$, the expression for Y is



Sol. $Y=AB'$

Q2 Simplify the following Boolean expression using Karnaugh Map in (a) sum of product form (b) product of sum form:

(i) $F(A,B,C,D,E) = \sum(13,15,17,18,19,20,21,23,25,27,29,31)$
 $d(A,B,C,D,E) = \sum(1,2,12,24)$

Sol.:

Sop:- $F = A.E + B.C.E + A.B'.C'.D + A.B'.C.D'$

POS:- $F = (A + B) (A + C) (B' + E) (C + D + E) (C' + D' + E)$

(ii) $F(A,B,C) = \sum(0,1,2,4,5)$
 $d(A,B,C) = \sum(3,6,7)$

Sol.:

Sop:- $F = 1$

POS:- $F = 1$

(iii) $F(A,B,C,D) = \sum(0,6,8,13,14)$
 $d(A,B,C,D) = \sum(2,4,10)$

Sol.:

Sop:- $F = B'.D' + C.D' + A.B.C'.D$

POS:- $F = (A + D') (B + D') (C' + D') (B' + C + D)$

(iv) $F(A,B,C,D) = A'B'D' + A'CD + A'BC$
 $d(A,B,C,D) = A'BC'D + ACD + AB'D'$

Sol.:

Sop:- $F = B'.D' + C.A'$

POS:- $F = A'. (B + D'). (C + D') . (B' + C)$

Where 'd' represent don't care condition.

Q3 Simplify the following Boolean expression using Karnaugh Map in Product of sum

(i) $F(A,B,C,D) = \pi(1,3,5,7,12,13,14,15)$

Sol. $F = (A + D') (A' + B')$

(ii) $F(A,B,C) = \sum(0,1,2,5,7)$

Sol. $F = (A' + C) (A + C' + B')$

(iii) $F(A,B,C,D,E) = \sum(0,1,4,5,16,17,21,25,29)$

Sol. $F = D' \cdot (A + B') (B' + E) \cdot (A' + C' + E)$

Q4

Simplify the following Boolean expression using karnaugh Map and implement them with NAND gates only.

(i) $F(A,B,C) = \sum(1,2,3,4,5,7)$

Sol.: $F = C + A \cdot B' + A' \cdot B$

(ii) $F(A,B,C,D) = \sum(0,1,2,3,4,8,9,12)$

Sol.: $y = C' \cdot D' + A \cdot B' + C' \cdot B'$

(iii) $F(A,B,C,D) = \pi(1,3,5,7,13,15)$

Sol.: $F = D' + A \cdot B'$

(iv) $F(A,B,C,D) = AB + A'BC + A'B'C'D$

Sol.: $F = A'B'C'D + A \cdot B + C \cdot B$

(v) $F(A,B,C,D) = B'D + B'C + ABCD$

$d(A,B,C,D) = A'BD + AB'C'D'$

Sol.: $F = CD + D \cdot B' + C \cdot B'$

Q5

Simplify the following Boolean expression using karnaugh Map and implement them with NOR gates only.

(i) $F(A,B,C,D) = \sum(2,4,6,10,12)$

$d(A,B,C,D) = \sum(0,8,9,13)$

Sol.: $F = (D') (A' + B' + C')$

(ii) $F(A,B,C,D) = AB' + C'D' + A'CD'$

Sol.: $F = (A + D') (B' + D') (A' + B' + C')$

(iii) $F(A,B,C,D) = (A' + B' + D') (A' + B + C') (A' + B + D') (C + A + D')$

Sol.: $F = (B + D') (A' + D') (A' + B + C')$