

DIGITAL ELECTRONICS (14B11EC317)

Tutorial-3

Q1 Simplify the following Boolean expression using Karnaugh Map in sum of Product

(i) $F(A,B,C,D) = ACD' + C'D + AB' + ABCD$

Sol. $F = C'.D + A.B' + A.C$

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

Sol. $F = C'.D' + A'.C + B.D'$

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

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

(iv) $F(A,B,C,D,E) = A'B'CE' + B'C'D'E' + A'B'D' + B'CD' + A'CD + A'BD$

Sol. $F = A'BD + A'B'D' + A'CD + B'CD' + B'D'E'$

Q2 Minimize the following Boolean expression using k-map and verify it by laws of Boolean algebra:

(i) $F(A,B,C) = ABC + A'B + ABC' + AC + A'B'C'$

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

(ii) $F(A,B,C) = A'C' + ABC + AC' + AB' + A$

Sol. $F = C' + A$

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

Sol. $F = 0$

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

Q4 Simplify the following Boolean expression using Karnaugh Map in (a) sum of Product (b) Product of sum

(i) $F(A,B,C,D) = \pi(1,3,5,7,12,13,14,15,2,10)$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(vii) $F(A,B,C,D,E) = A'B'CE' + B'C'D'E' + A'B'D' + A'CD + A'BD$

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

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

Q5 Simplify the following Boolean expression in (a) sum of Product (b) Product of sum

(i) $F(A,B,C,D) = \pi(1,3,5,7,12,13,14,15,2)$

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

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

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

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

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

(iii) $F(A,B,C,D,E) = \sum(0,1,4,5,16,17,21,25,29,12,10)$

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

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