

Q1. Consider a Boolean function $F(A, B, C, D)$. It has the following Prime Implicants:

$A.B.C'$, $B.C'.D'$, $A'.C.D'$, $A'.B.D'$, $A.B'.C$, $B'.C.D'$, $A.D$.

(i) Draw the Karnaugh map for $F(A, B, C, D)$.

CD	00	01	11	10
AB	00	01	11	10
00	0	0	0	1
01	1	0	0	1
11	1	1	1	0
10	0	1	1	1

(ii) Obtain the simplified expression for F in the POS form.

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

(iii) Specify the Essential Prime Implicants, if any.

$$A+D' \quad B+C+D \quad A'+B'+C'+D$$

Q2. Two Boolean functions are given as:

$$F1(A, B, C, D) = \pi (M(1, 3, 4, 5, 7, 8, 9, 12), d(10,11)).$$

$$F2(A, B, C, D) = \pi (M(0, 5, 10, 13, 14, 15), d(1, 7, 12)).$$

$$F3(A, B, C, D) = F1(A, B, C, D). F2(A, B, C, D)$$

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F1	1	0	1	0	0	0	1	0	0	0	d	d	0	1	1	1
F2	0	d	1	1	1	0	1	d	1	1	0	1	d	0	0	0
F3	0	0	1	0	0	0	1	0	0	0	0	d	0	0	0	0

$$F3 = \pi (M(0,1,3,4,5,7,8,9,10,12,13,14,15), d(11))$$

$$= \sum (m(2,6), d(11))$$

Use Karnaugh map to **simplify** the function $F_3(A, B, C, D)$. (Hints: $d.1 = d$; $d.0 = 0$)

CD	00	01	11	10
AB	00	01	11	10
00				1
01				1
11				
10			d	

Obtain the simplified expression in the SOP form.

$$F_3(A, B, C, D) = A'.C.D'$$