Bc190206456

Assignment no#:2

CS302

Q1: Write the SOP expression for the given sum.

$$\sum_{ABCDE}(2,4,6,8,10,12,14,16,18,20,22,24,26,28,30)$$

Solution:

A	B	C	D	E
0	0	0	0	0
0	0	0	0	1
0	0	0	1	0
0	0	0	1	1
0	0	1	0	0
0	0	1	0	1
0	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
0	1	1	0	1

0	1	1	1	0
0	1	1	1	1
1	0	0	0	0
1	0	0	0	1
1	0	0	1	0
1	0	0	1	1
1	0	1	0	0
1	0	1	0	1
1	0	1	1	0
1	0	1	1	1
1	1	0	0	0
1	1	0	0	1
1	1	0	1	0
1	1	0	1	1
1	1	1	0	0
1	1	1	0	1
1	1	1	1	0
1	1	1	1	1

A	B	C	D	E	OUTPUT

					(F)
0	0	0	0	0	0
0	0	0	0	1	0
0	0	0	1	0	1
0	0	0	1	1	0
0	0	1	0	0	1
0	0	1	0	1	0
0	0	1	1	0	1
0	0	1	1	1	0
0	1	0	0	0	1
0	1	0	0	1	0
0	1	0	1	0	1
0	1	0	1	1	0
0	1	1	0	0	1
0	1	1	0	1	0
0	1	1	1	0	1
0	1	1	1	1	0
1	0	0	0	0	1
1	0	0	0	1	0
1	0	0	1	0	1
1	0	0	1	1	0

1	0	1	0	0	1
1	0	1	0	1	0
1	0	1	1	0	1
1	0	1	1	1	0
1	1	0	0	0	1
1	1	0	0	1	0
1	1	0	1	0	1
1	1	0	1	1	0
1	1	1	0	0	1
1	1	1	0	1	0
1	1	1	1	0	1
1	1	1	1	1	0

FOR SOP WE FOCUS ON 1 VALUE.

A	B	C	D	E	MINTERM
0	0	0	1	0	$\overline{A}\overline{B}\overline{C}D\overline{E}$
0	0	1	0	0	$\overline{A}\overline{B}C\overline{D}\overline{E}$
0	0	1	1	0	$\overline{A}\overline{B}CD\overline{E}$

0	1	0	0	0	$\overline{A}B\overline{C}\overline{D}\overline{E}$
0	1	0	1	0	$\overline{A}B\overline{C}D\overline{E}$
0	1	1	0	0	$\overline{A}BC\overline{D}\overline{E}$
0	1	1	1	0	$\overline{A}BCD\overline{E}$
1	0	0	0	0	$A\overline{B}\overline{C}\overline{D}\overline{E}$
1	0	0	1	0	$A\overline{B}\overline{C}D\overline{E}$
1	0	1	0	0	$A\overline{B}C\overline{D}\overline{E}$
1	1	1	0	0	$ABC\overline{D}\overline{E}$
1	1	0	0	0	$AB\overline{C}\overline{D}\overline{E}$
1	1	0	1	0	$AB\overline{C}D\overline{E}$
1	1	1	0	0	$ABC\overline{D}\overline{E}$
1	1	1	1	1	ABCDE

SOP EXPRESSION:

SUM OF PRODUCT EXPRESSION

$$\sum_{ABCDE} = (\overline{A}BC\overline{D}\overline{E}) + (\overline{A}B\overline{C}D\overline{E}) + (\overline{A}B\overline{C}D\overline{E}) + (\overline{A}B\overline{C}\overline{D}\overline{E}) + (\overline{A}\overline{B}C\overline{D}\overline{E}) + (\overline{A}\overline{B}C\overline{D}\overline{E}) + (\overline{A}\overline{B}\overline{C}D\overline{E}) + (\overline{A}\overline{B}\overline{C}\overline{D}\overline{E}) + (A\overline{B}\overline{C}\overline{D}\overline{E}) + (A\overline{B}\overline{C}D\overline{E}) + (A\overline{B}C\overline{D}\overline{E}) + (ABC\overline{D}\overline{E}) + (AB\overline{C}\overline{D}\overline{E}) + (AB\overline{C}D\overline{E}) + (ABC\overline{D}\overline{E}) + (ABCDE)$$

Q2: Find Prime Implicant of midterm using QuineMcculsky method.

$$\sum_{ABCDE}(2,4,6,8,10,12,14,16,18,20,22,24,26,28,30)$$

Step-1

00010	2
00100	4
01000	8
10000	16
00110	6
01010	10
01100	12
10010	18
10100	20
11000	24
01110	14
10110	22
11010	26
11100	28
11110	30

Step-2

2,6(00-10) 2,10(0-010) 2,18(-0010)

4,12(0-100) 4,6(001-0) 4,20(-0100)

8,10(010-0) 8,24(-1000)

16,18(100-0) 16,20(10-00) 16,24(10-00)

6,14(0-110) 6,22(-0110)

10,14(01-10)10,26(-1010)

12,14(011-0) 12,28(-1100)

18,26(1-010) 18,22(10-10)

20,22(101-0) 20,22(1-100)

24,26(110-0) 24,28(11-00)

14,30(-1110) 22,30(1-110) 26,30(11-10) 28,30(111-0)

Step-3

2,6,18,22(-0-10) 2,6,10,14(0--10)2,10,18,26(--010)2,18,6,22(-0-10)

2,18,10,26(--010)4,12,6,14(0-1-0) 4,6,12,14 (0-1-0)

4,6,20,22(-01-0)4,20,6,22(-01-0) 4,20,12,28(--100) 8,10,12,14(01--0) 8,24,10,26(-10-0) 8,24,12,28 (-1-00)

6,14,22,30 (--110) 6,22,14,30(--110) 10,14,26,30(-1-10) 10,26,14,30(-1-10) 12,14,28,30(-11-0) 12,14,28,30(-11-0)

18,26,22,30(1--10) 18,22,26,30(1--10) 20,22,28,30(1-1-0)

20,22,22,30(1-1-0) 24,26,28,30(11--0) 24,28,26,30(11--0)

Step-3

2,6,18,22(-0-10) $\overline{B}D\overline{E}$ 4,6,20,22(-01-0) $\overline{B}C\overline{E}$

2,18,10,22(-0-10) $\overline{B}D\overline{E}$ 4,20,6,22(-01-0) $\overline{B}C\overline{E}$

2,10,18,26(--010) $\bar{C}D\bar{E}$

2,18,6,22(--010) $\bar{C}D\bar{E}$

4,20,12,28(--100) $C\bar{D}\bar{E}$

6,14,22,30 (--110) $C\bar{D}\bar{E}$

12,14,28,30(-11-0) $BC\bar{E}$

12,14,28,30(-11-0) $BC\bar{E}$

20,22,28,30(1-1-0) $AC\bar{E}$

20,22,22,30(1-1-0) $AC\bar{E}$

6,22,14,30(--110) $AD\bar{E}$

8,10,12,14(01--0) $\bar{A}B\bar{E}$

8,24,12,28 (-1-00) $B\bar{D}\bar{E}$

8,24,10,26(-10-0) $B\bar{C}\bar{E}$

4,12,6,14(0-1-0) $\bar{A}C\bar{E}$

4,6,12,14 (0-1-0) $\bar{A}C\bar{E}$

10,14,26,30(-1-10) $BD\bar{E}$

10,26,14,30(-1-10) $BD\bar{E}$

18,26,22,30(1--10) $AD\bar{E}$

18,22,26,30(1--10) $AD\bar{E}$

24,26,28,30(11--0) $AB\bar{E}$

24,28,26,30(11--0) $AB\bar{E}$

Step-4

2,6,8,22(-0-10) $\bar{B}D\bar{E}$

2,10,18,26(--010) $\bar{C}D\bar{E}$

4,20,12,28(--100) $C\bar{D}\bar{E}$

12,14,28,30(-11-0) $BC\bar{E}$

4,6,20,22(-01-0) $\bar{B}C\bar{E}$

4,12,6,14(0-1-0) $\bar{A}C\bar{E}$

10,14,26,30(-1-10) $BD\bar{E}$

18,26,22,30(1--10) $AD\bar{E}$

20,22,28,30(1-1-0) $AC\overline{E}$ 24,26,28,30(11--0) $AB\overline{E}$

6,22,14,30(--110) $AD\overline{E}$ 8,10,12,14(01--0) $\overline{A}B\overline{E}$

8,24,12,28 (-1-00) $B\overline{D}\overline{E}$ 8,24,10,26(-10-0) $B\overline{C}\overline{E}$

<u>These are the prime implicants.</u>