Digital Logic & Design

BS – Multimedia Gamming

Recap

- Karnaugh Maps
- Mapping Standard SOP expressions
- Mapping Non-Standard SOP expressions
- Simplification of K-maps
- Don’t care states

Mapping a Standard POS expression

- Selecting n-variable K-map
- 0 marked in cell for each maxterm
- Remaining cells marked with 1

Mapping of Standard POS expression

- POS expression

$$(A+B+\overline{C}).(A+\overline{B}+C).(\overline{A}+B+\overline{C}).(\overline{A}+\overline{B}+\overline{C})$$

AB\C	0	1
00	1	0
01	0	1
11	1	0
10	1	0

A\BC	00	01	11	10
0	1	0	1	0
1	1	0	0	1

Simplification of POS expressions using K-map

- Mapping of expression
- Forming of Groups of 0s
- Each group represents sum term
- 3-variable K-map
  - 1 cell group yields a 3 variable sum term
  - 2 cell group yields a 2 variable sum term
  - 4 cell group yields a 1 variable sum term
  - 8 cell group yields a value of 0 for function

Simplification of POS expressions using K-map3

- 4-variable K-map
  - 1 cell group yields a 4 variable sum term
  - 2 cell group yields a 3 variable sum term
  - 4 cell group yields a 2 variable sum term
  - 8 cell group yields a 1 variable sum term
  - 16 cell group yields a value of 0 for function

Simplification of POS expressions using K-map

$$(B + C).(A + \overline{B} + \overline{C})$$

AB\C	0	1
00	0	1
01	1	0
11	1	1
10	0	1

A\BC	00	01	11	10
0	0	1	1	1
1	1	0	0	0

$$(A + B + C).(\overline{A} + \overline{C}).(\overline{A} + \overline{B})$$

Simplification of POS expressions using K-map

$(A+B).(B+C)$

AB\C	0	1
00	0	0
01	1	1
11	1	1
10	0	1

A\BC	00	01	11	10
0	0	0	1	1
1	1	1	1	0

$(A+B).(\overline{A}+\overline{B}+C)$

Simplification of POS expressions using K-map

$$(A+\overline{B}+C).(A+C+D).(B+\overline{C}+D)$$

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

Simplification of POS expressions using K-map

$$(A + C).(C + \overline{D}).(B + \overline{C} + D)$$

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

Simplification of POS expressions using K-map

$$(A+\overline{B}+C).(A+\overline{B}+\overline{D}).(B+C+\overline{D}).(\overline{A}+\overline{B}+\overline{C}+D)$$

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