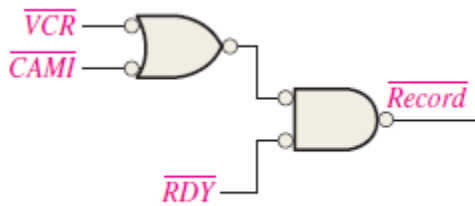
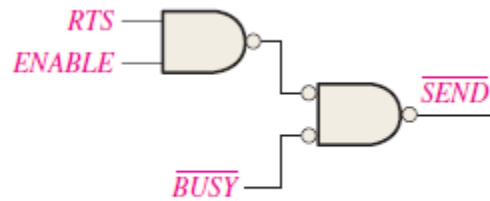


# Assignment- 4

- Draw the logic circuit represented by each of the following expressions:
  - $X = [AB(C'D)]'$
  - $X = (A+B+C'DE') + B'CD'$
- Draw a logic circuit for the case where the output, ENABLE, is HIGH only if the inputs, ASSERT and READY, are both LOW.
- Draw a logic circuit for the case where the output, HOLD, is HIGH only if the input, LOAD, is LOW and the input, READY, is HIGH.
- Develop the truth table for each of the circuits in Figure.

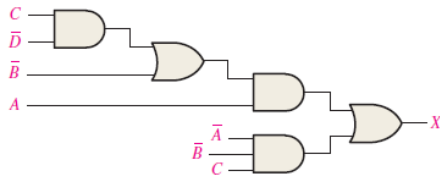


(a)

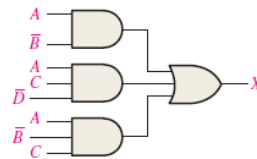


(b)

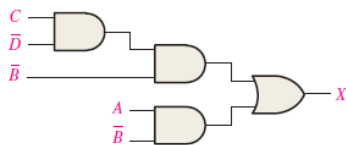
- Determine which of the logic circuits in Figure are equivalent



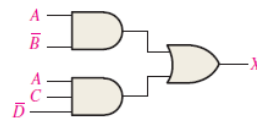
(a)



(b)



(c)



(d)

- Define the domain of each SOP expression in above Problem convert the expression to standard SOP form.
  - $BC' + DE(B'C + DE)$
  - $B'C(CD + C)$
  - $B + C[BD + (C' + D)E']$

- Develop a truth table for each of the following standard SOP expressions:

(a)  $ABC + \overline{A}\overline{B}C + ABC$

(b)  $A\overline{B}C\overline{D} + ABC\overline{D} + \overline{A}\overline{B}CD + \overline{A}\overline{B}C\overline{D}$

(c)  $WXYZ + \overline{W}\overline{X}YZ + W\overline{X}Y\overline{Z} + \overline{W}\overline{X}YZ + W\overline{X}Y\overline{Z}$

(d)  $\overline{X}Y\overline{Z} + \overline{X}Y\overline{Z} + X\overline{Y}Z + \overline{X}YZ + XY\overline{Z}$

8. Develop a truth table for each of the standard POS expressions:

(a)  $(A + B + C)(\bar{A} + \bar{B} + \bar{C})(A + \bar{B} + C)$

(b)  $(X + \bar{Y})(\bar{X} + Z)(X + \bar{Y} + \bar{Z})(\bar{X} + \bar{Y} + Z)$

(c)  $A(B + \bar{C})(\bar{A} + C)(A + \bar{B} + C)(\bar{A} + B + \bar{C})$

9. For each truth table in Table, derive a standard SOP and a standard POS expression.

$ABCD$	$X$	$ABCD$	$X$
0000	1	0000	0
0001	1	0001	0
0010	0	0010	1
0011	1	0011	0
0100	0	0100	1
0101	1	0101	1
0110	1	0110	0
0111	0	0111	1
1000	0	1000	0
1001	1	1001	0
1010	0	1010	0
1011	0	1011	1
1100	1	1100	1
1101	0	1101	0
1110	0	1110	0
1111	0	1111	1

10. Use a Karnaugh map to find the minimum SOP form for each expression:

(a)  $\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C}$

(b)  $AC(\bar{B} + C)$

(c)  $\bar{A}(BC + B\bar{C}) + A(BC + B\bar{C})$

(d)  $\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC$

11. Use a Karnaugh map to simplify each expression to a minimum SOP form:

(a)  $\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC$

(b)  $AC[\bar{B} + B(B + \bar{C})]$

(c)  $DE\bar{F} + \bar{D}E\bar{F} + \bar{D}E\bar{F}$

12. Use a Karnaugh map to simplify each expression to a minimum SOP form:

- (a)  $A + B\overline{C} + CD$
- (b)  $\overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}\overline{C}D + ABCD + ABC\overline{D}$
- (c)  $\overline{A}B(\overline{C}\overline{D} + \overline{C}D) + AB(\overline{C}\overline{D} + \overline{C}D) + A\overline{B}\overline{C}D$
- (d)  $(\overline{A}\overline{B} + A\overline{B})(CD + \overline{C}\overline{D})$
- (e)  $\overline{A}\overline{B} + A\overline{B} + \overline{C}\overline{D} + C\overline{D}$

13. Use a Karnaugh map to simplify each Boolean functions.

- (a)  $F(x, y, z) = \Sigma(0, 1, 5, 7)$
- (b)  $F(x, y, z) = \Sigma(1, 2, 3, 6, 7)$
- (c)  $F(x, y, z) = \Sigma(3, 5, 6, 7)$
- (d)  $F(A, B, C) = \Sigma(0, 2, 3, 4, 6)$

14. Use a Karnaugh map to simplify each Boolean functions.

- (a)  $F(w, x, y, z) = \Sigma(1, 4, 5, 6, 12, 14, 15)$
- (b)  $F(A, B, C, D) = \Sigma(0, 1, 2, 4, 5, 7, 11, 15)$
- (c)  $F(w, x, y, z) = \Sigma(2, 3, 10, 11, 12, 13, 14, 15)$
- (d)  $F(A, B, C, D) = \Sigma(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$