Digital Logic Design
Daily Practice Problems
Day -5

60. The Boolean expression $AC + B\overline{C}$ is equivalent to

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

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

(C) $AC + B\overline{C} + \overline{B}C + ABC$

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

61. The simplified form of the Boolean expression $Y = (\overline{A}.BC + D)(\overline{A}.D + \overline{B}.\overline{C})$ can be written as

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

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

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

(D) $A.\overline{D} + BC.\overline{D}$

62. If P, Q, R are Boolean variables, then

$$\left(P+\overline{Q}\right)\left(P.\overline{Q}+P.R\right)\left(\overline{P}.\overline{R}+\overline{Q}\right)$$

Simplifies to

(A) $P.\overline{Q}$

(B) $P.\overline{R}$

(C) $P.\overline{Q}+R$

(D) $P.\overline{R}+Q$

63. The simplified SOP (Sum of Product) form of the Boolean expression.

$$(P+\overline{Q}+\overline{R}).(P+\overline{Q}+R).(P+Q+\overline{R})$$

(A) $(\overline{P}Q+\overline{R})$

(B) $P+\overline{Q}\overline{R}$

(C) $(\overline{P}Q+R)$

(D) $(PQ+R)$

64 Consider the following Boolean expression:

$$F = (X + Y + Z)(\bar{X} + Y)(\bar{Y} + Z)$$

Which of the following Boolean expressions is/are equivalent to F?

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

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

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

(d) $Z(\bar{x} + y)$

65. A Boolean function F of three variables X, Y and Z is given as

$F(X, Y, Z) = (X' + Y + Z) \cdot (X + Y' + Z') \cdot (X' + Y + Z') \cdot (X' Y' Z' + X' Y Z' + X Y Z')$

Which one of the following is true?

(a) $F(X, Y, Z) = (X + Y + Z') \times (X' + Y' + Z')$

(b) $F(X, Y, Z) = (X' + Y) \times (X + Y' + Z')$

(c) $F(X, Y, Z) = X'Z' + YZ'$

(d) $F(X, Y, Z) = X' Y' Z + X Y Z$

66. A switching function f(A,B,C,D) = A'B'CD+A'BC'D+A'BCD+AB'C'D+AB'CD can also be written as

(a) $\Sigma m\,(1,3,5,7,9)$ (b) $\Sigma m\,(3,5,7,9,11)$ (c) $\Sigma m\,(3,5,9,11,13)$ (d) $\Sigma m\,(5,7,9,11,13)$

67. The switching function f(A,B,C,D) = Σm (5,9,11,14) can be written as

(a) A' B C' D+A B' C' D+A B' CD+ABCD'

(b) A' B' C' D + AB' C' D + A' B' CD + ABCD'

(b) A' BC' D + A' BC' D' + AB' C D' + ABCD

(d) None

68. The switching function f(A,B,C) = (A+B'+C)(A'+B'+C)(A+B'+C') can also be written as

(a) Σm(2,3,6) (b) Σm (0,1,4,5,7) (c) Σm (1,2,5,6,7) (d) Σm (0,2,4,6)

69. The other canonical form of f(A,B,C) = Σm (0,1,5,7) is

(a) ΠM (2,3,4,6) (b) ΠM (2,4,6,8) (c) ΠM (2,5,6,7) (d) ΠM (1,3,5,7)

70. If a three variable switching function is expressed as the product of maxterms by f(A,B,C) = ΠM(0,3,5,6) then it can also be expressed as the sum of minterms by

(a) Σm(0,3,5,6) (b) ΠM(1,2,4,7) (c) Σm (1,2,4,7) (d) ΠM (1,2,4,7)

71. The logic expression F = XY+XZ'+YZ is known as
(a) SSOP form (b) SOP form (c) POS form (d) SPOS form

72. The logic expression F = (x+y+z)(x+y')(y+z')(x+z) is known as

(a) SOP form (b) SSOP form (c) SPOS form (d) POS form

73. The logic expression $F = \Sigma\, m\,(0,3,6,7,10,12,15)$ is equivalent to

(a) $F = \Pi M(0,3,6,7,10,12,15)$

(b) $F = \Pi M(1,2,4,5,8,9,11,13,14)$

(c) $F = \Sigma\, m(0,1,5,6,7,12,15)$

(d) $F = \Sigma\, m\,(1,2,4,5,8,9,11,13,14)$

74. Identify number of literals in the given Boolean function F = x' yz+xyz+xy' z

(a) 5 (b) 4 (c) 3 (d) 6

75. A minterm is nothing but

(a) Standard sum term
(b) Standard product term
(c) May be standard sum term or product term
(d) None

76. A maxterm is nothing but a

(a) Standard sum term
(b) Standard product term
(c) May be standard sum term or product term
(d) None

77. The Boolean function expressed in standard sum of products form or standard product of sums form is called

(a) Canonical form (b) Conical form (c) Both 1 and 2 (d) None

78. **The complement of**
$F(x, y, z) = \prod M(2, 4, 5, 7)$ is

(a) $\sum m(0, 1, 3, 6)$ (b) $\sum m(2, 4, 5, 7)$

(c) $\sum m(0, 1, 2, 3)$ (d) $\sum m(0, 5, 6, 7)$

79. **There are four Boolean variables x_1, x_2, x_3 and x_4. The following function are defined on sets of them**

$f(x_3, x_2, x_1) = \sum m(3, 4, 5)$

$g(x_4, x_3, x_2) = \sum m(1, 6, 7)$

$h(x_4, x_3, x_2, x_1) = fg$

Then $h(x_4, x_3, x_2, x_1)$ is

(a) $\sum m(3, 12, 13)$ (b) $\sum m(3, 6)$

(c) $\sum m(3, 12)$ d) 0

80. **Given $F_1 = \prod M\ (0, 4, 5, 6)$ and $F_2 = \prod M\ (0, 3, 4, 6, 7)$. The maxterm expansion for $F_1\ F_2$ is given by**

(a) $\prod M\ (3, 5, 7)$ (b) $\prod M\ (1, 2)$

(c) $\prod M\ (0, 3, 4, 5, 6, 7)$ (d) $\prod M\ (0, 3, 5, 7)$

81. **Consider the following Boolean function, f (A,B,C) = A + ABC. Which of the following represents the function in the sum of minterms?**

(a) Σm (2, 3, 6, 7)

(b) Σm (4, 5, 6, 7)

(c) Σm (1, 4, 5, 6)

(d) None of these

82. **The Boolean expression for the truth table shown below is**

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A	B	C	f
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

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

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

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

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

83. **What is the function $y = A + \overline{B}C$ in product of sum (POS) form (where A is MSB and C is LSB)**

(a) $\pi M(1,4,5,6,7)$

(b) $\pi M(0,1,2,3)$

(c) $\pi M(0,2,3)$

(d) $\pi M(0,3,4)$

84. **The max terms expansion of f (ABCD) = $A + B\bar{C} + AB\bar{D} + ABCD$**

(a) $\pi M(4,5,8,9,10,11,12,13,14,15)$

(b) $\pi M(0,1,2,3,6,9)$

(c) $\pi M(0,1,2,3,6,7,8,9,10,11)$

(d) $\pi M(0,1,2,3,6,7)$

85. The Boolean expression

$F(X,Y,Z) = \bar{X}Y\bar{Z} + X\bar{Y}\bar{Z} + XY\bar{Z} + XYZ$

converted into the canonical product of sum (POS) form is

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

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

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

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

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A function of Boolean variables X, Y and Z is expressed in terms of the min-terms as

$F(X,Y,Z) = \sum(1,2,5,6,7)$

Which one of the product of sums given below is equal to the function $F(X,Y,Z)$?

(a) $(\bar{X} + \bar{Y} + \bar{Z}).(\bar{X} + Y + Z).(X + \bar{Y} + \bar{Z})$

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

(c) $(\bar{X} + \bar{Y} + Z).(\bar{X} + Y + \bar{Z}).(X + \bar{Y} + Z).(X + Y + \bar{Z}).(X + Y + Z)$

(d) $(X + Y + \bar{Z}).(\bar{X} + Y + Z).(\bar{X} + Y + \bar{Z}).(\bar{X} + \bar{Y} + Z).(\bar{X} + \bar{Y} + \bar{Z})$

87. Consider the following Sum of Products expression, F.

$F = ABC + \overline{A}\overline{B}C + A\overline{B}C + \overline{A}BC + \overline{A}\overline{B}\overline{C}$

The equivalent Product of Sums expression is

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

(b) $F = (A + B + \overline{C})(A + B + C)(\overline{A} + \overline{B} + \overline{C})$

(c) $F = (\overline{A} + B + \overline{C})(A + \overline{B} + \overline{C})(A + \overline{B} + C)$

(d) $F = (\overline{A} + \overline{B} + C)(A + B + \overline{C})(A + B + C)$

88. The minterm expansion of f (P, Q, R) $PQ+Q\overline{R}+P\overline{R}$ is _____

(A) $m_2 + m_4 + m_6 + m_7$

(B) $m_0 + m_1 + m_3 + m_5$

(C) $m_0 + m_1 + m_6 + m_7$

(D) $m_2 + m_3 + m_4 + m_5$

89. A function F (A, B, C) defined by three Boolean variables A, B and C when expressed as sum of products is given by:

$$F = \bar{A}.\bar{B}.\bar{C} + \bar{A}.B.\bar{C} + A.\bar{B}.\bar{C}$$

Where, $\bar{A}$, $\bar{B}$, and $\bar{C}$ and the complements of the respective variables. The product of sums (POS) form of the function F is

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

(b) $F(\bar{A} + \bar{B} + \bar{C}).(\bar{A} + B + \bar{C}).(A + \bar{B} + \bar{C})$

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

(d) $F = (\bar{A} + \bar{B} + C).(\bar{A} + B + C).(A + \bar{B} + C).(A + B + \bar{C}).(A + B + C)$

90. The product of sum expression of a Boolean function F (A, B, C) of three variables is given by $F(A,B,C) = (A + B + \bar{C}).(A + \bar{B} + \bar{C}).(\bar{A} + B + C).(\bar{A} + \bar{B} + \bar{C})$ The canonical sum of product expression of $F(A,B,C)$ is given by

(a) $\bar{A}\bar{B}C + \bar{A}BC + A\bar{B}\bar{C} + ABC$
(b) $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}C + AB\bar{C}$
(c) $AB\bar{C} + A\bar{B}\bar{C} + \bar{A}BC + \bar{A}\bar{B}\bar{C}$
(d) $\bar{A}\bar{B}\bar{C} + \bar{A}BC + AB\bar{C} + ABC$