18/18

# SECR1013 DIGITAL LOGIC QUIZ 2 (SET 2)

## TIME: 30 MINUTES

**Instruction: Please answer the following objective questions in answers table on the last page.**

| | |
|---|---|
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| Metric Number: | A23CS0241 |
| Section: | 02 |

1. Given the rules of Boolean Algebra, which of the following expressions is equivalent to $A + AB$. (1M)

   A. $B$
   B. $A$
   C. $A + B$
   D. $A.B$

2. Solve this Boolean Expression $\overline{A\bar{C}} + B\bar{D}$ ? (2M) $= \overline{\overline{A\bar{C}}} \cdot \overline{B\bar{D}} = AC \cdot (\bar{B} + \bar{\bar{D}})$ $= AC \cdot (\bar{B} + D)$

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

3. Which of the following is the CORRECT answer for the simplification of this Boolean expression? (2M)

$$X = ABC + BC + A(B + C)$$
$$= ABC + BC + AB + AC$$
$$= AB(C+1) + BC + AC$$
$$= AB + BC + AC$$
$$= AB + C(B + A)$$

   A. $X = AB + BC$
   B. $X = AB + AC + BC$
   C. $X = AC + A + BC$
   D. $X = A$

4. Which of the following is the CORRECT truth table for this Boolean expression? (2M)

$$X = A\bar{C} + A(C + 1) + BC$$
$$10 \quad 1 \quad 1 \quad 11 \qquad A\bar{C}$$

A.

| A | B | C | X |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |

B.

| A | B | C | X |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 |



$X = A\bar{C} + AC + A + BC$
$= A(B+\bar{B})\bar{C} + A(B+\bar{B})C + A(B+\bar{B}) + (A+\bar{A})BC$
$= AB\bar{C} + A\bar{B}\bar{C} + ABC + A\bar{B}C + AB(C+\bar{C}) + A\bar{B}(C+\bar{C}) + ABC + \bar{A}BC$
$= AB\bar{C} + A\bar{B}\bar{C} + ABC + A\bar{B}C + AB\bar{C} + ABC + AB\bar{C} + A\bar{B}\bar{C} + ABC + \bar{A}BC$
$= AB\bar{C} + A\bar{B}\bar{C} + ABC + A\bar{B}C + \bar{A}BC$

C.

| A | B | C | X |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 |

D.

| A | B | C | X |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |

5. Determine which Boolean expression is POS. (1M)

A. $\overline{ABC} + \bar{A}BC$

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

C. $AB\bar{C}D + A\bar{C} + \bar{B}C$

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

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

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

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

6. Convert the following Boolean expression to standard POS. (2M)

$$F = (A + B + C)(A + C)(B)$$

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

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

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

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

POS

7. Represent the following KMAP using pi notation π. (2M)

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

A. $\pi_{ABCD}$ (0, 1, 4, 6, 11, 15)

B. $\pi_{ABCD}$ (0, 1, 4, 6, 10, 15)

C. $\pi_{ABCD}$ (0, 1, 4, 5, 10, 15)

D. $\pi_{ABCD}$ (0, 1, 4, 6, 10, 14)

0000 0
0001 1
0100 4
1111 15
1010 10
0110 & 6

8. Determine how many groups are created for the following SOP KMAP. (2M)

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

A. 2

B. 3

C. 4

D. 5

9. Get the minimum SOP expression for KMAP below. (2M)

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

A. $\bar{B}\bar{D} + AB + \bar{B}\bar{D}$

B. $\bar{B}\bar{D} + A\bar{B} + BD$

C. $BD + AB + BD$

D. $\bar{B}\bar{D} + AB + BD$

$\bar{B}\bar{D}$
$AB$
$BD$

10. Get the minimum POS expression for KMAP below. (2M)

| A \ BC | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | 0 | 1 | 0 | X |
| 1 | 0 | 1 | 1 | X |

$A + \bar{B}$

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

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

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

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

**Answers Table:**

| | | | | |
|---|---|---|---|---|
| 1. B | 2. D | 3. B | 4. A | 5. B |
| 6. D | 7. B | 8. B | 9. D | 10. D |