# EAST WEST UNIVERSITY

A/2 Jahurul Islam Avenue, Jahurul Islam City
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Answer Script

**Signature of the Invigilator with Date :** 12.3.2023

**Student's Name :** Md. Alee Zafor **ID :** 2020-2-60-158

**Semester :** Spring 2023 **Examination :** mid 1 **Date :** 12-03-23

**Course Code :** CSE345 **Course Title :** Digital logic design **Section :** 02

**Course Instructor :** _____

***N.B. Students are to carefully read the instructions written on the inside cover page.***

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**Marks Obtained**

| | |
|---|---|
| 1. | 7.5 |
| 2. | 6 |
| 3. | 4 |
| 4. | 3 |
| 5. | 8 |
| 6. | 8 |
| 7. | |
| 8. | |
| 9. | |
| 10. | |
| Total | 36.5 |

CO1 = 36.5
CO2 =
CO3 =
CO4 =

**Signature of the Course Instructor**

① ⓐ 135 + 73

$(135)_{10} = 10000111$

$(73)_{10} = 01001001$

$(208)_{10} = 11010000$

Answer: $(11010000)_2$

ⓑ 2's complement of 193

$(193)_{10} \rightarrow (11000001)_2 \xrightarrow{\text{2's complement}}$

$(10011111)_2$

$= (-193)_{10}$

(Answer)

ⓒ $(-128) - (63)$ [consider 2's complement signed number]

$(128)_{10} \rightarrow (010000000)_2 \xrightarrow{\text{2's complement}}$

$(11000000000)_2$

$= (-128)_{10}$

$(63)_{10} \rightarrow (00111111)_2$

$\downarrow$ 2's complement

$(11000001)_2$

$= (-63)_{10}$

We know, $x - y = x + (-y)$

or $(-x) + (-y)$

So, we can write,

$(-128)_{10} \rightarrow 1100.0000$

$(-63)_{10} \rightarrow 11000001$

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$(-191)_{10} \rightarrow \boxed{1}10100001$ (overflow)

↳ discard

$(10100001)_2 = (33)_{10}$

(Answer)

(d) $(-97)+(-164)$ [ consider 2's complement signed number system ]

$(97)_{10} \rightarrow (01100001)_2$ 2's complement $\rightarrow$

$(10011111)_2 = (-97)_{10}$

$(164)_{10} \rightarrow (10100100)_2$ 2's complement $\rightarrow$

$(10101100)_2 = (-164)_{10}$

$(-97)_{10} \rightarrow$ 10011111

$(-164)_{10} \rightarrow$ 10101100

$(261)_{10} \rightarrow$ 100011011 (overflow)

↳ discard

$(00011011)_2 = (123)_{10}$

(Answer)

(3) Given,

$F(A,B,C,D) = \{(B+C')AD\} + \{D'(A'+BC)\}$

$\therefore F' = \left[\{(B+C')AD\} + \{D'(A'+BC)\}\right]'$

$= \{(B+C')AD\}' \cdot \{D'(A'+BC)\}'$

$= \{(B+C')' + (AD)'\} \cdot \{(D')' + (A')' \cdot (BC)'\}$

$= \{B'C + (A'+D')\} \cdot \{D + A \cdot (B'+C')\}$

(Answer)

(4) Given,

$F(A,B,C,D) = (B'C + A'D)(A'+B'+D')C'$

$= (B'C+A)(B'C+D)(A'+B'+D')C'$

$= (B'+A)(C+A)(B'+D)(C+D)$

$(A'+B'+D')C'$

$= (A+B'+0+0)(A+0+C+0)(0+B'+0+D)$

$(0+0+C+D)(A'+B'+0+D')$

$(0+0+C'+0)$

$= (A + B' + C.C' + D.D')(A + B.B' + C + D.D')$
$(A.A' + B' + C.C' + D)(A.A' + B.B' + C + D)$
$(D' + B' + C.C' + D)(A.A' + B.B' + C + D.D')$

$= (A + B' + C + D)(A + B' + C' + D')(A + B + C + D)$
$(A + B' + C + D')(A + B' + C + D)(A' + B' + C + D)$
$(A + B + C + D)(A' + B' + C + D)(A' + B' + C + D)$
$(A' + B' + C' + D)(A + B + C + D)(D' + B' + C + D)$

$= (A + B + C + D)(A + B' + C + D)(A + B' + C' + D')$
$(A + B' + C + D')(A' + B' + C' + D)$
$(A' + B' + C + D)(A' + B' + C + D')$

There will be 14 Maxterms (Answer)

(5)

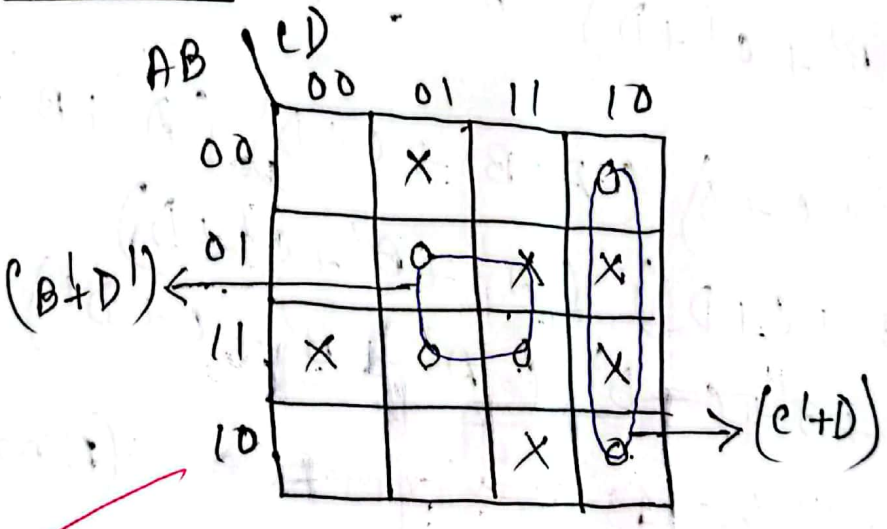
Given,

$F(A,B,C,D) = \sum(0,3,4,8,9) + \sum_{d.c}(1,6,7,11,12,14)$

POS:

$F(A,B,C,D) = \prod(2,5,10,13,15) \cdot \prod_{dc}(1,6,7,11,12,14)$

K-map:




~~$F = B'D + C'D$ (Answer)~~

$F = (B'+D') \cdot (C'+D)$ (Answer)

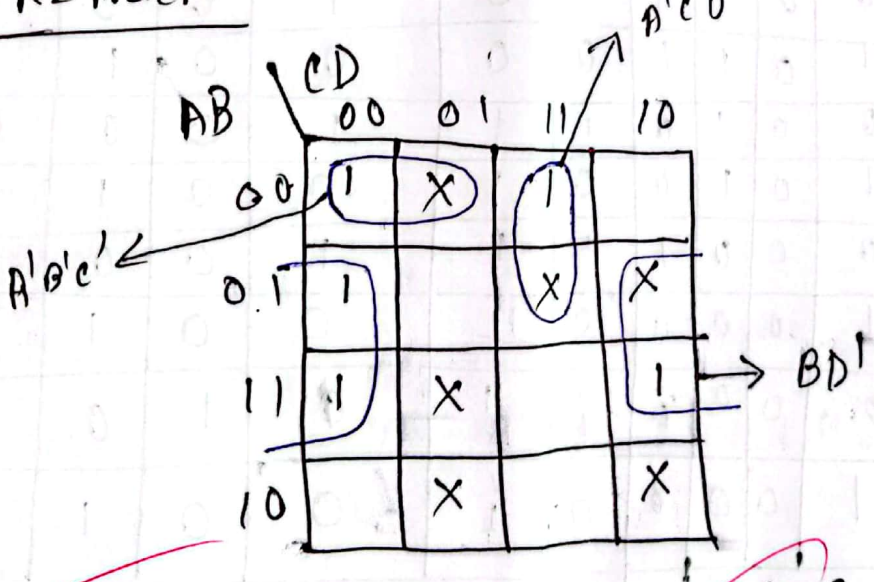
(6) Given,

$F(A, B, C, D) = \prod (2, 5, 8, 11, 15) \cdot \prod_{d.c} (1, 6, 7, 9, 10, 13)$

SOP:

$F(A, B, C, D) = \sum (0, 3, 4, 12, 14) + \sum_{d.c} (1, 6, 7, 9, 10, 13)$

K-map:




$F = A'B'C' + A'CD + BD'$ (Answer)

(2) ~~Given, F = (A.~~

Given, $F(A,B,C,D) = (B+AC)(B'+C')D' + BD'(A'+D)$

Truth Table

| A | B | C | D | A' | B' | C' | D' | (B+AC) | (B'+C')D' | BD' | A'+D | BD'(A'+D) | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |