'Assignment-02'

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Ans. to the question no-01

Given,

$$(A \oplus B)(C+D)(A \odot C) + (A+B)(C'+D)(A'+CC')$$

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

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

$$= (A'B \cdot AC + A'B \cdot A'C' + AB'AC + AB'A'C')(C+D) + (A \cdot A' + A'B)(C'+D)$$

$$= (A \cdot A' \cdot BC + A' \cdot A' \cdot B \cdot C' + AA' \cdot B'C + A \cdot A' \cdot B'C')(C+D) + (0+A'B)(C'+D)$$

$$= (0 \cdot BC + A'BC' + AB'C + 0 \cdot B'C')(C+D) + A'B(C'+D)$$

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

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

$$= A'BC'C + A'BCD + AB'C \cdot C + AB'CD + A'B(C'+D)$$

$$= 0 + A'BCD + AB'C + AB'CD + A'B(C'+D)$$

$$= A'BCD + AB'C + AB'CD + A'B(C'+D)$$

$$= A'BCD + AB'C + A'BC' + ABD$$

$$= ABC' + A'BC'D + AB'C + A'BD$$

$$= A'BC' + AB'C + A'BD$$

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

(Ans.)

Ans. to the que. no-02

Given,

$$(x'+y+z')\ (x+y')\ (x'+z)$$

Now, firstly taking the duality of the given expression,

$$= x'yz' + xy' + x'z$$

then, complementing each literal to find the complement of the whole expression.

$$= xy'z + x'y + xz'$$

So, the complement is,

$$= xy'z + x'y + xz' \quad \text{(Ans.)}$$

Ans. to the que. no - 03

Given,

$$F(v,w,x,y,z) = wy + wx + x'y$$

i) SOP:

$$= F(v,w,x,y,z)$$

$$= wy + wx + x'y$$

$$= wy(v+v')(x+x')(z+z') + wx(v+v')(y+y')(z+z') + x'y(v+v')(w+w')(z+z')$$

$$= wy(vx+vx'+v'x+v'x')(z+z') + wx(vy+vy'+v'y+v'y')(z+z') + x'y(vw+vw'+v'w+v'w')(z+z')$$

$$= wy(vxz+vxz'+vx'z+vx'z'+v'xz+v'xz'+v'x'z+v'x'z') + wx(vyz+vyz'+vy'z+vy'z'+v'yz+v'yz'+v'y'z+v'y'z') + x'y(vwz+vwz'+vw'z+vw'z'+v'wz+v'wz'+v'w'z+v'w'z')$$

$$= wyvxz + wyvxz' + wyvx'z + wyvx'z' + wyv'xz + wyv'xz' + wyv'x'z + wyv'x'z' + wxvyz + wxvyz' + wxvy'z + wxvy'z' + wxv'yz + wxv'yz' + wxv'y'z + wxv'y'z' + x'yvwz + x'yvwz' + x'yvw'z + x'yvw'z' + x'yv'wz + x'yv'wz' + x'yv'w'z + x'yv'w'z'$$

$$= vwxyz + vwxyz' + vwx'yz + vwx'yz' + vw'xyz + vw'xyz' + vw'x'yz + vw'x'yz' + v'wxyz + v'wxyz' + v'wx'yz + v'wx'yz' + v'w'xyz + v'w'xyz' + v'w'x'yz + v'w'x'yz'$$

$$= 11111, 11011, 01111, 01011, 11110, 11010, 01110, 01010, 11101, 01101, 11100, 01100, 10011, 00011, 10010, 00010$$

$= \sum (31, 27, 15, 11, 30, 26, 14, 10, 29, 13, 28, 12, 19, 3, 18, 2)$

$= \sum (2, 3, 10, 11, 12, 13, 14, 15, 18, 19, 26, 27, 28, 29, 30, 31)$

(Ans.)

ii) POS:

$F(v, w, x, y, z)$

$= wy + wx + x'y$

$= (wy + wx + x')(wy + wx + y)$

$= (wx + x' + w)(wx + x' + y)(wx + y + w)(wx + y + y)$

$= (x' + w + w)(x' + w + x)(x' + y + w)(x' + y + x)(y + w + w)(y + w + x)(y + y + w)(y + y + x)$

$= (x' + w)(x' + y + w)(w + y)(w + y + x)(x + y)$

$= (x' + w + v \cdot v' + y \cdot y' + z \cdot z')(x' + y + w + v \cdot v' + z \cdot z')(w + y + v \cdot v' + x \cdot x' + z \cdot z')(w + y + x + v \cdot v' + z \cdot z')(x + y + v \cdot v' + w \cdot w' + z \cdot z')$

$= (x' + w + v \cdot v' + y \cdot y' + z)(x' + w + v \cdot v' + y \cdot y' + z')(x' + y + v \cdot v' + w + z)(x' + y + v \cdot v' + w + z')(w + y + v \cdot v' + x \cdot x' + z)(w + y + v \cdot v' + x \cdot x' + z')(w + y + x + v \cdot v' + z)(w + y + x + v \cdot v' + z')(x + y + v \cdot v' + w \cdot w' + z)(x + y + v \cdot v' + w \cdot w' + z')$

$= (x' + w + v \cdot v' + z + y)(x' + w + v \cdot v' + z + y')(x' + w + y \cdot y' + z' + v)(x' + w + y \cdot y' + z' + v')$
$(x' + y + w + z + v)(x' + y + w + z + v')(x' + y + w + z' + v)(x' + y + w + z' + v')$
$(w + y + v \cdot v' + z + x)(w + y + v \cdot v' + z + x')(w + y + v \cdot v' + z' + x)(w + y + v \cdot v' + z' + x')$
$(w + y + x + z + v)(w + y + x + z + v')(w + y + x + z' + v)(w + y + x + z' + v')$

$(x+y+v.v'+z+w)(x+y+v.v'+z+w')(x+y+v.v'+z'+w)(x+y+v.v'+z'+w'$

$= (v+w+x'+y+z)(v'+w+x'+y+z)(v+w+x'+y'+z)(v'+w+x'+y+z)(v+w+x'+y+z')$

$(v+w+x'+y'+z')(v'+w+x'+y+z')(v'+w+x'+y'+z')(v+w+x'+y+z)$

$(v'+w+x'+y+z)(v+w+x'+y+z')(v'+w+x'+y+z')(v+w+x+y+z)$

$(v'+w+x+y+z)(v+w+x'+y+z)(v'+w+x'+y+z)(v+w+x+y+z')$

$(v'+w+v+y+z')(v+w+x'+y+z')(v'+w+x'+y+z')(v+w+x+y+z)$

$(v'+w+x+y+z)(v+w+x+y+z')(v'+w+x+y+z')(v+w+x+y+z)$

$(v'+w+x+y+z)(v+w'+x+y+z)(v'+w'+x+y+z)(v+w+x+y+z')(v'+w+x+y+z')$

$(v+w'+x+y+z')(v'+w'+x+y+z')$

$= (v+w+x'+y+z)(v'+w+x'+y+z)(v+w+x'+y'+z)(v'+w+x'+y'+z)$

$(v+w+x'+y+z')(v+w+x'+y'+z')(v'+w+x'+y+z')(v'+w+x'+y'+z')$

$(v+w+x+y+z)(v'+w+x+y+z)(v+w+x+y+z')(v'+w+x+y+z')$

$(v+w'+x+y+z)(v'+w'+x+y+z')$

$= 00100,\ 10100,\ 00110,\ 10110,\ 00101,\ 00111,\ 10101,$

$10111,\ 00000,\ 10000,\ 00001,\ 10001,\ 01000,\ 11000,$

$11001,\ 01001$

$= \prod(4, 20, 6, 22, 5, 7, 21, 23, 0, 16, 1, 17, 8, 24, 25, 9)$

$= \prod(0, 1, 4, 5, 6, 7, 8, 9, 16, 17, 20, 21, 22, 23, 24, 25)$

(Ans.)