CSE 260

ASSIGNMENT -02

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Section: 11

Answer to the Question 1

(a) $x'yz' + x'yz + xyz + x'yz'$

$= (x'yz' + x'yz') + x'yz + xyz$

$= x'yz' + x'yz + xyz$ (Ans)

(b) $(x'+y')(x+y)$

$= xx' + xy' + x'y + yy'$

$= x'y + xy'$ (Ans)

(c) $(a'+b)'(a+b')'$

$= \{(a')' + b'\}\{a' \cdot (b')'$

$= ab' \cdot a'b$

$= aa' \cdot bb' = 0$ (Ans)

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

$= \cancel{xx'} + x'y + x'z' + xy' + \cancel{yy'} + y'z' + xz' + yz' + z'z'$

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

$= x'y + xy' + z'(x'+y'+x+y+1)$

$= xy' + x'y + z'$ Ans)

(e) $(b'c + ad')(a'b + c'd)$

$= a'bb'c + aa'bd' + cc'b'd + ac'd'd$

$= 0$ (Ans)

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

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

$= xy + z'(x + x' + y + 1)$

$= xy + z'$ (Ans)

Answer to the question no 2

(a) $x'y' + xy'$

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

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

(b) $(a'b' + cd')e + e'$

$[\{(a'+b')(c+d')\} + e]e'$

$= [\{(a+b)(c'+d)\} + e']e$

$= (a+b+e')(c'+d+e')e$ (Ans)

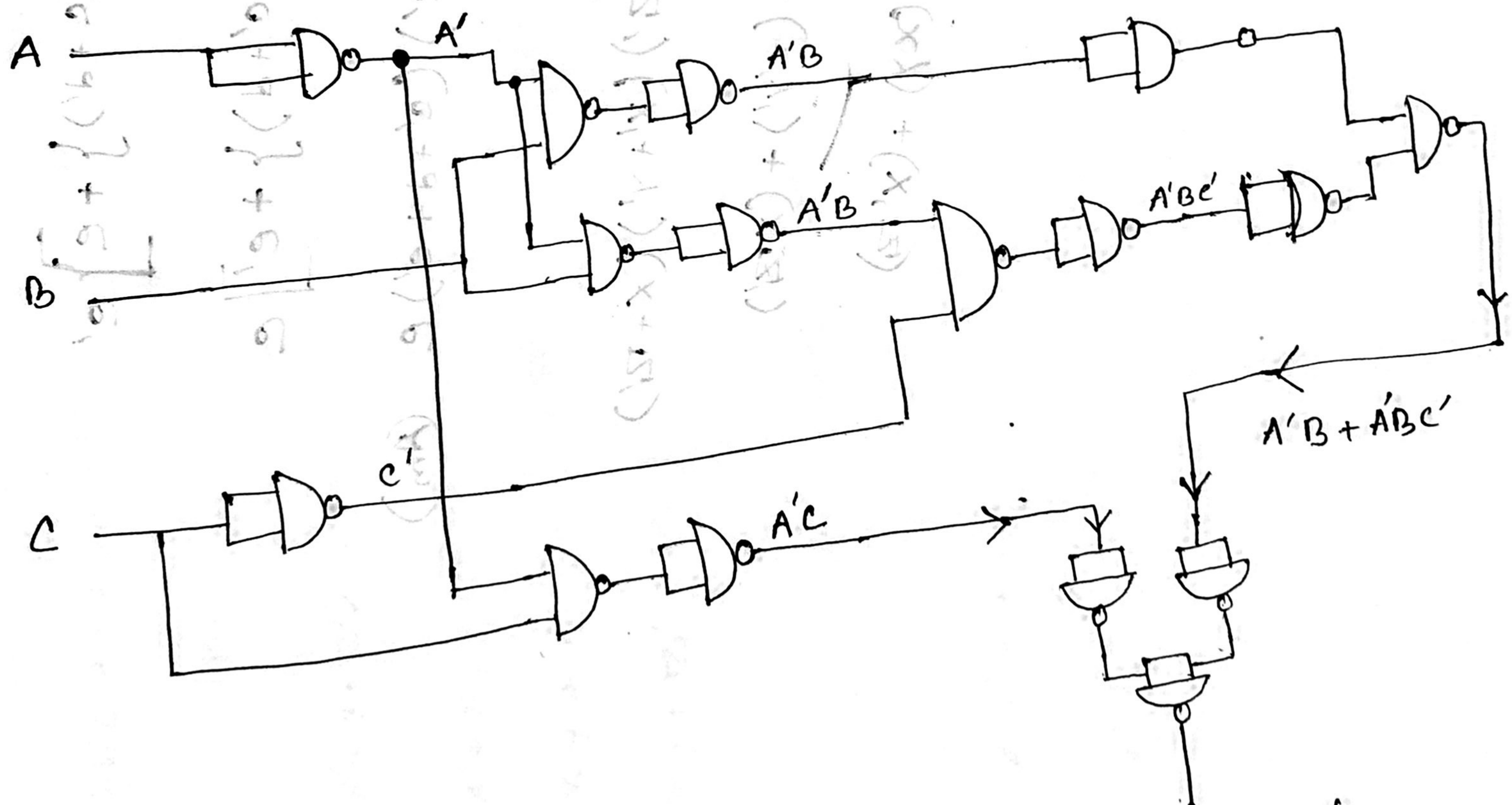
(c) $(x'+y+z')(x'+y')(x+z')$

$= (x'yz') + (x'y') + (xz')$

$= (xy'z) + (xy) + (x'z)$

Answer to Question 3 (a)

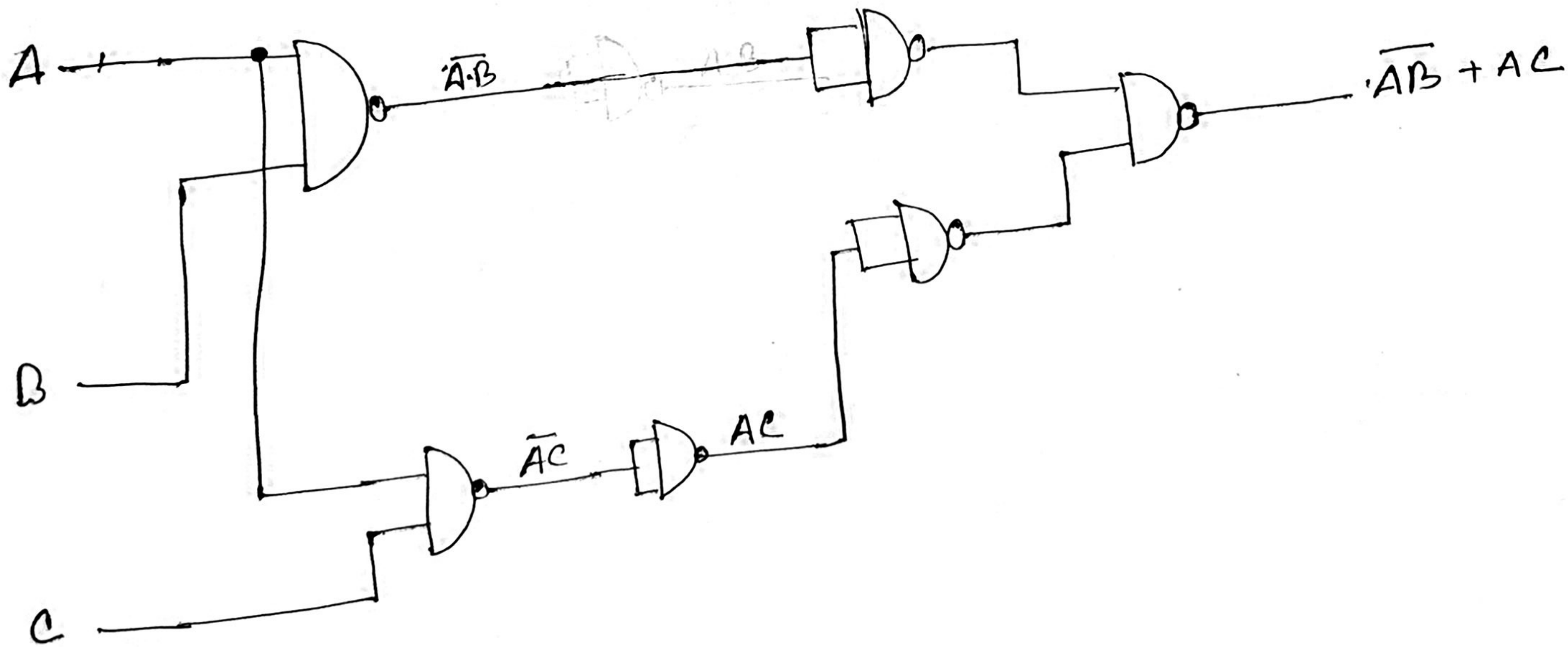
$$F(A,B,C) = A'B + A'BC' + A'C$$



$$F = A'B + A'BC' + A'C$$

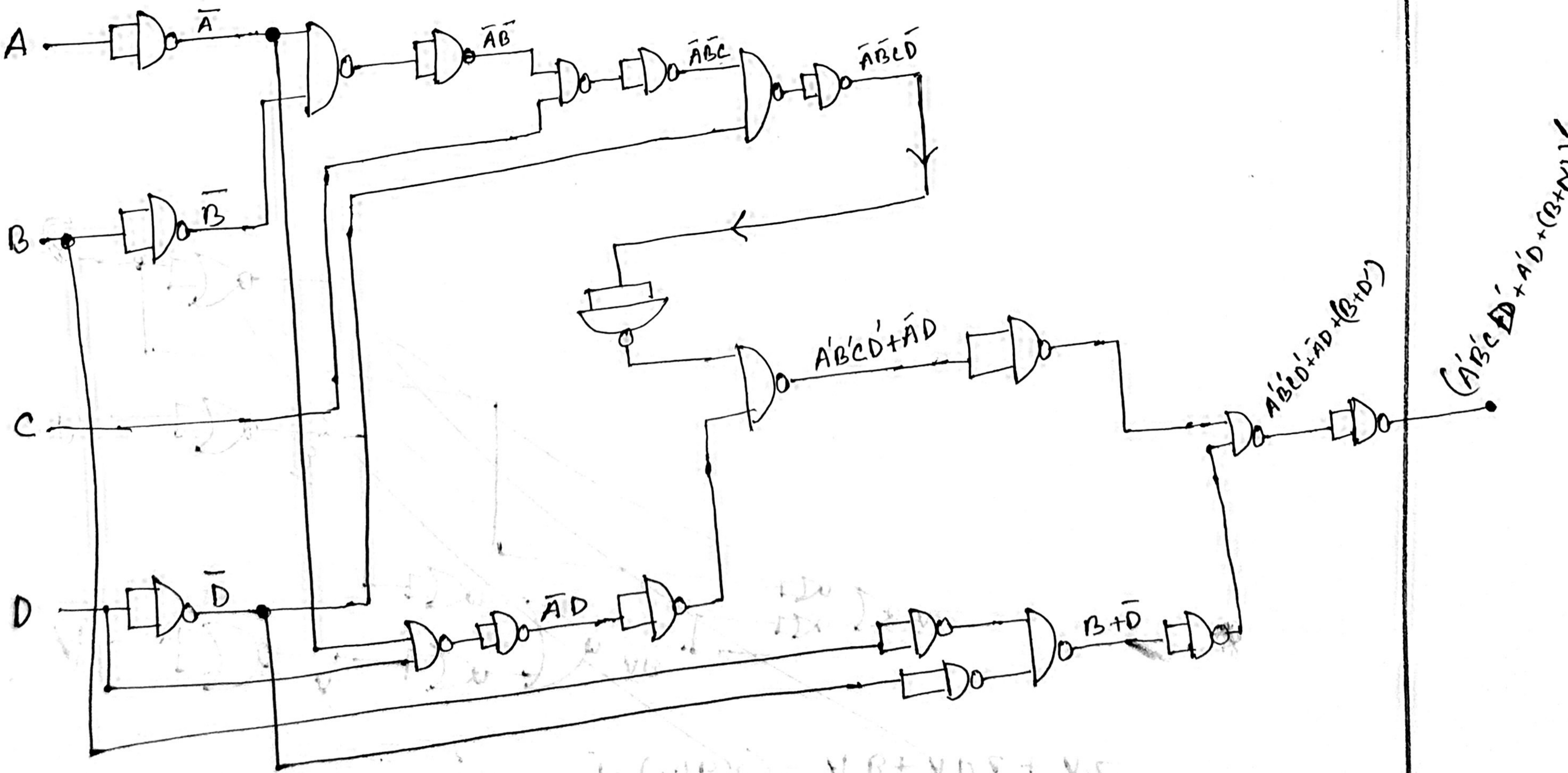
Answer to the question 3(b)

$$F(A,B,C) = (AB)' + (AC)$$



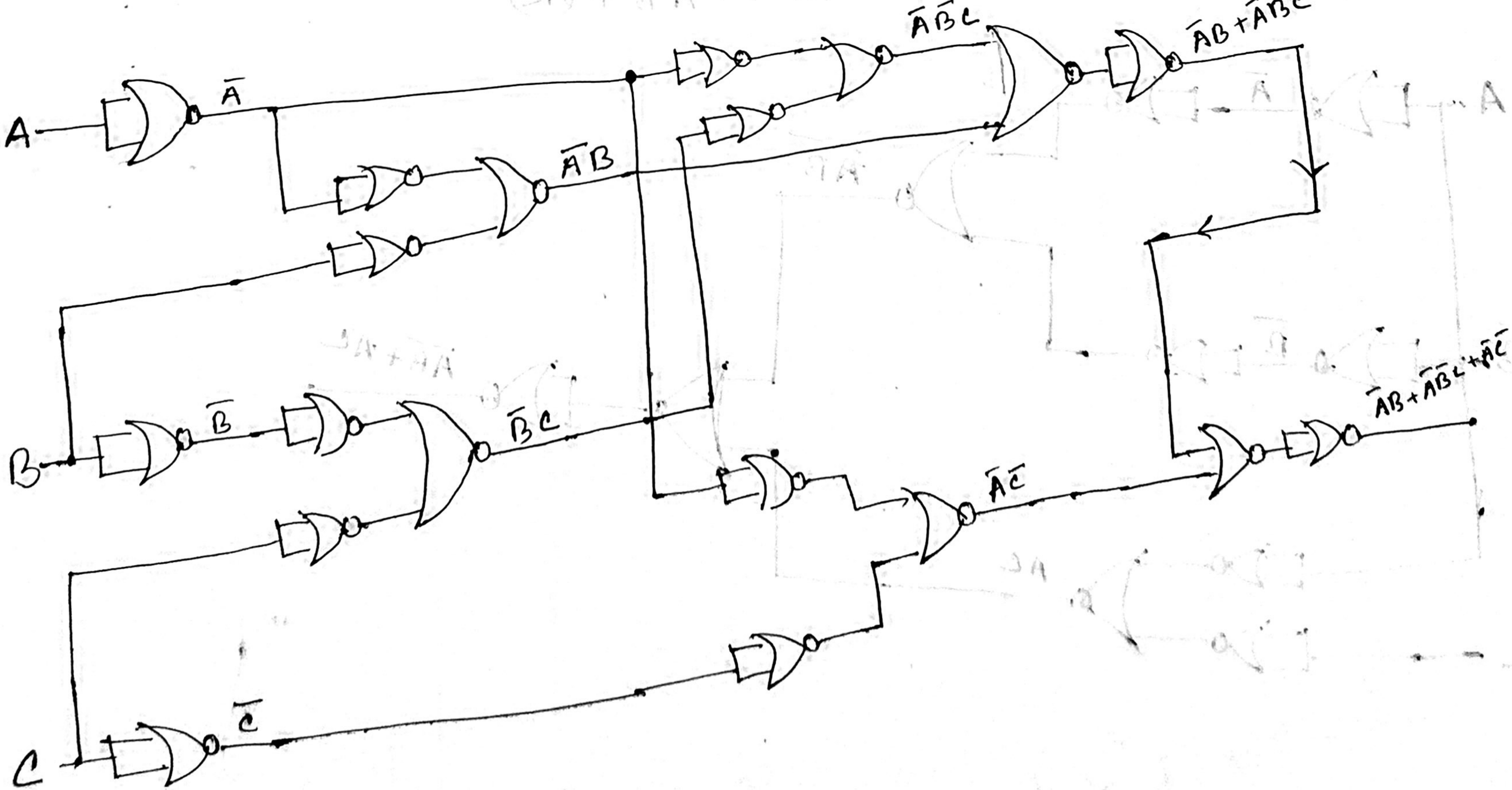
Answer to the question no 3 (c)

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



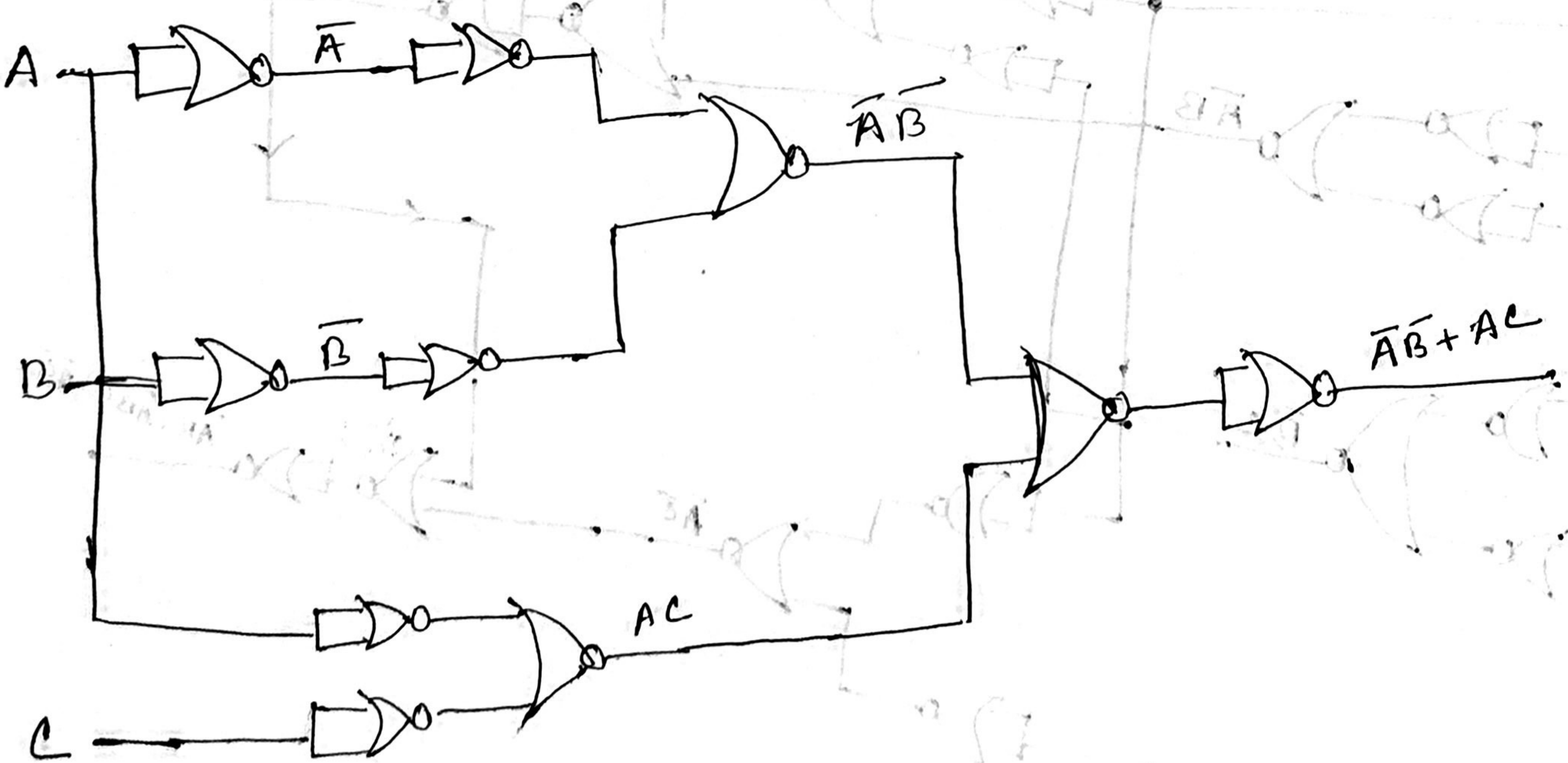
Answer to the Question No 4(a)

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



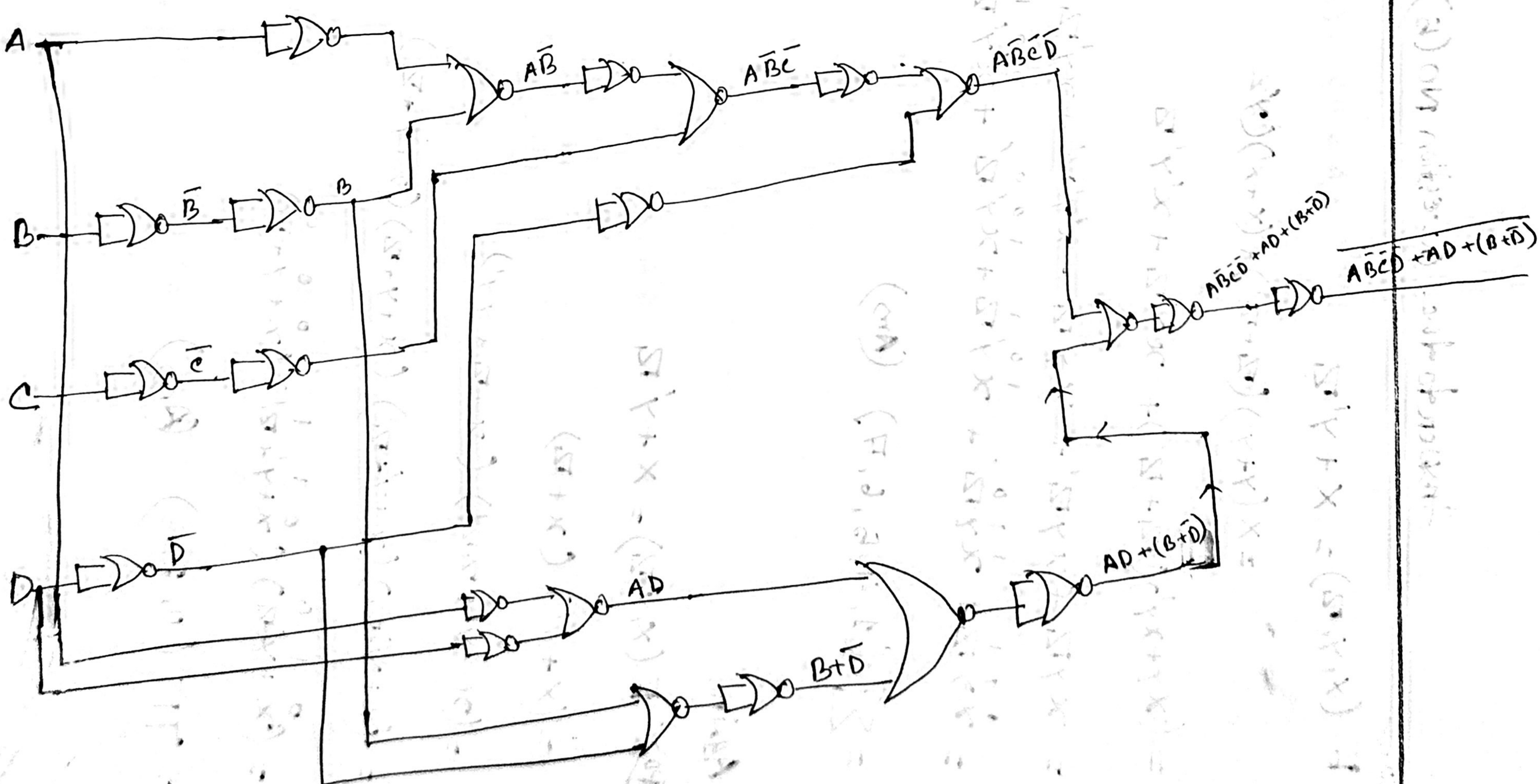
Answer to the question No 4(b)

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



Answer to the Question No 4 (c)

$$F(A,B,C,D) = \overline{\left(A\bar{B}\bar{C}\bar{D} + AD + (B+\bar{D})\right)}$$



Answer to the Question NO (5)

a) SOP

$F(x,y,z) = x + y'z$

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

$= (xy+xy')(z+z') + xy'z + x'y'z$

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

$= \overset{1}{x}\overset{1}{y}\overset{1}{z} + \overset{1}{x}\overset{1}{y}\overset{0}{z'} + \overset{1}{x}\overset{0}{y'}\overset{1}{z} + \overset{1}{x}\overset{0}{y'}\overset{0}{z'} + \overset{0}{x'}\overset{0}{y'}\overset{1}{z}$

$= \sum(1,4,5,6,7)$ (Ans)

Again,

POS $F(x,y,z) = x + y'z$

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

$= (x+y'+zz')(x+z+yy')$

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

$= (\overset{0}{x}+\overset{1}{y'}+\overset{0}{z})(\overset{0}{x}+\overset{1}{y'}+\overset{1}{z'})(\overset{0}{x}+\overset{0}{y}+\overset{0}{z})$

$= \prod(0,2,3)$ (Ans)

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

SOP:

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

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

$$= ABCD + ABCD' + ABC'D + ABC'D' + A'BCD' + A'B'CD' + A'BC'D' + A'B'C'D'$$

$$= \Sigma(15, 14, 13, 12, 6, 2, 4, 0)$$

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

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

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

$$= (A+A'+BB')(A'+B+CC')(A+BB'+D)(AA'+B+D')$$

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

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

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

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

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

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

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

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

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

$$= \overset{1}{(A'}+\overset{0}{B}+\overset{0}{C}+\overset{0}{D})\,\overset{1}{(A'}+\overset{0}{B}+\overset{0}{C}+\overset{1}{D'})\,\overset{1}{(A'}+\overset{0}{B}+\overset{1}{C'}+\overset{0}{D})\,\overset{1}{(A'}+\overset{0}{B}+\overset{1}{C'}+\overset{1}{D'})$$

$$\overset{0}{(A}+\overset{0}{B}+\overset{0}{C}+\overset{0}{D})\,\overset{0}{(A}+\overset{0}{B}+\overset{1}{C'}+\overset{0}{D})\,\overset{0}{(A}+\overset{1}{B'}+\overset{1}{C'}+\overset{0}{D})$$

$= \prod(11, 10, 9, 8, 7, 5, 3, 1)$

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

SOP

$= WX'Y(Z+Z') + W'Y'(X+X')(Z+Z')$

$= WX'YZ + WX'YZ' + (W'XY' + W'X'Y')(Z+Z')$

$= \overset{1}{W}\overset{0}{X'}\overset{1}{Y}\overset{1}{Z} + \overset{1}{W}\overset{0}{X'}\overset{1}{Y}\overset{0}{Z'} + \overset{0}{W'}\overset{1}{X}\overset{0}{Y'}\overset{1}{Z} + \overset{0}{W'}\overset{1}{X}\overset{0}{Y'}\overset{0}{Z'} +$

$\overset{0}{W'}\overset{0}{X'}\overset{0}{Y'}\overset{1}{Z} + \overset{0}{W'}\overset{0}{X'}\overset{0}{Y'}\overset{0}{Z'}$

$= \sum(0, 1, 4, 5, 10, 11)$

POS $= (WX'Y + W')(WX'Y + Y')$

$= \cancel{(WX' + W')(Y + W')(WX' + Y')(Y + Y')}$

$= \cancel{\{WX'(Y+Y')(Z+Z')\}}\{Y + W' +$

$= (W+W')(X'Y+W')(WX'+Y)(Y+Y')$

$= (X'+W')(Y+W')(W+Y)(X'+Y)$

$= (X'+W+YY')(Y+W'+XX')(W+Y+XX')(X'+Y+WW')$

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

$$(x'+y+w)\cdot(x'+y+w')$$

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

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

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

$$(w+x'+y'+z')\cancel{(w+x+y+z)}(w+x+y+z')$$

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

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

$$=\prod(2,3,6,7,8,9,12,13,14,15,\cancel{\ })$$

Am

6

A	B	C	AC	A'	A'BC	AC+A'BC	A+B	(A+B)C
0	0	0	0	1	0	0	0	0
0	0	1	0	1	0	0	0	0
0	1	0	0	1	0	0	1	0
0	1	1	0	1	1	1	1	1
1	0	0	0	0	0	0	1	0
1	0	1	1	0	0	1	1	1
1	1	0	0	0	0	0	1	0
1	1	1	1	0	0	1	1	1

$\therefore \quad AC + A'BC = (A+B) \cdot C$ [Proved]

7. (a) $F(a,b) = a'b' + ab'$

a \ b	0	1
0	1	0
1	1	0

Ans: b'

(b) $F(A,B,C) = m(1,2,3,4,5)$

A \ BC	00	01	11	10
0		1	1	
1	1	1		

$= A'C + AB'$

(c) $F(a,b,c) = abc' + a'b'c + ab'c' + a'bc$

a \ bc	00	01	11	10
0	1	1	1	
1	1			1

$= a'b' + b'c' + ac'$ Ans

d) $F(a,b,c,d) = a'b' + b'c' + c'a$

$= a'b'(c+c')(d+d') + b'c'(a+a')(d+d') + c'a(b+b')(d+d')$

$= a'b'cd + a'b'cd' + a'b'c'd + a'b'c'd' + abc'd + ab'c'd' +$

$abc'd + abc'd'$

$= \sum(0,1,2,3,8,9,12,13)$

ab \ cd	00	01	11	10
00	1	1	1	1
01				
11	1	1		
10	1	1		

$= a'b' + ac'$

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

$+ wxy'z + x'y'z' + w'xy'$

$= w'x'y'z' + wx'yz' + w'x'yz' + wxy'z +$

$(w+w')\{x'y'z' + w'xy'(z+z')\}$

$= w'x'y'z' + wx'y'z' + w'x'yz' + wxy'z$

$+ wx'yz' + w'x'y'z' + w'xyz + w'xy'z'$

$= \sum(0, 2, 4, 5, 8, 10, 13)$

wx \ yz	00	01	11	10
00	1			
01	1	1		
11		1		
10	1			1

$= w'y'z + w'xy' + xyz' + w'x'z' + wx'z'$

8)

a

$Q = (F=1,\ M=1,\ H+A=1)$

T = at lest two input 1

G = less than " " "

T.T

F	H	M	A	Q	T	G
0	0	0	0	0	0	1
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	1	0
0	1	0	0	0	0	1
0	1	0	1	0	1	0
0	1	1	0	0	1	0
0	1	1	1	0	1	0
1	0	0	0	0	0	1
1	0	0	1	0	1	0
1	0	1	0	0	1	0
1	0	1	1	1	1	0
1	1	0	0	0	1	0
1	1	0	1	0	1	0
1	1	1	0	1	1	0
1	1	1	1	1	1	0

b

K map - Q:

$$F(F,H,M,A) = \sum(11,14,15)$$

FH \ MA	00	01	11	10
00				
01				
11			1	1
10			1	

A: $FMA + FHM$

K map - G:

$$F(F,H,M,A) = \sum(0,1,2,4,8)$$

FH \ MA	00	01	11	10
00	1	1		1
01	1			
11				
10	1			

$= F'M'A' + F'H'M' + F'H'A' + H'M'A'$

9)

A = 1,

(i) ~~G=0~~ G = 0 and M = 1

(ii) M = 1 and (D = 0, L = 1)

(iii) G = 0 and L = 1 and M = 1

(iv) L = 0 and M = 0 and D = 1

T.T.

G	L	D	M	A
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

b)

$F(G,L,D,M) = \Sigma(1,2,3,5,7,9,10,13,15)$

GL \ DM	00	01	11	10
00		1	1	1
01		1	1	
11		1	1	
10		1		1

$= D'M + L'DM' + G'M + LM$

c) $F = D'M + L'DM' + G'M + LM$