

Name

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Program

BS (CS)

subject

DL 9.

Assignment

No.

3

ID

NO

15393.

Q 1)

Ans

$$A + B + C + D = 0$$

when $A=0, B=0, C=0, D=0$. Ans

Q 2)

Ans

$$A + B + C + D = 1$$

If Either $A=1$ or $B=1$ or $C=1$ or $D=1$

Ans

Q 3)

Ans

$$ABC = 0$$

If Either $A=0$ or $B=0$ or $C=0$.

Ans

Q 4)

Ans

$$0 + 0 + 0 + 1 = 1$$

2

b)

Aus

$$\cancel{1 \cdot 0 \cdot 1 \cdot 0} =$$

$$1 \cdot 0 \cdot 1 \cdot 0 = 0 \quad \underline{\text{Aus}}$$

c)

Aus

$$1 \cdot 0 + 1 \cdot 0 + 1 \cdot 0 + 1 \cdot 0$$

$$0 + 0 + 0 + 0 = 0 \quad \underline{\text{Aus}}$$

Q 5)

a)

Aus

~~ABC~~

$$\bar{A}\bar{B}C = 1$$

only if $A=0$, $B=0$, ~~etc~~ $\Rightarrow \bar{A}=1$, $\bar{B}=1$

$$C=1$$

Aus

6)

Ans

$$\bar{A} + \bar{B} + C = 0$$

only if.

$$A=1, B=1 \Rightarrow \bar{A}=0, \bar{B}=0, C=1$$

Ans

Ans

Q 6)

a) Ans $\overline{(ABC)} \overline{(EFG)} + \overline{(HIJ)} \overline{(KLM)}$

sol: $\overline{(ABC)} \overline{(EFG)} + \overline{(HIJ)} \overline{(KLM)} \Rightarrow \bar{A}\bar{B}\bar{C} = \bar{A}\bar{B}$

$$\overline{(ABC)} \overline{(EFG)} \overline{(HIJ)} \overline{(KLM)} = \bar{A} = A$$

$$= (\bar{A} + \bar{B} + \bar{C}) (\bar{E} + \bar{F} + \bar{G}) (\bar{H} + \bar{I} + \bar{J}) (\bar{K} + \bar{L} + \bar{M}) \Rightarrow \bar{ABC} = \bar{A} + \bar{B} + \bar{C}$$

Ans

b)

Ans

~~$(\overline{A+B}) (\overline{C+D}) (\overline{E+F}) (\overline{G+H})$~~

$(\overline{A+B}) (\overline{C+D}) (\overline{E+F}) (\overline{G+H}) \Rightarrow \overline{A} = A$

$(\overline{A+B}) (\overline{C+D}) (\overline{E+F}) (\overline{G+H}) \Rightarrow \overline{A+B} = \overline{A} \overline{B}$

Ans

Q.7)

a) Ans

$= (AB) + C$

Ans

b)

Ans

$= (\overline{A}B) \text{ or } (A+\overline{B})$

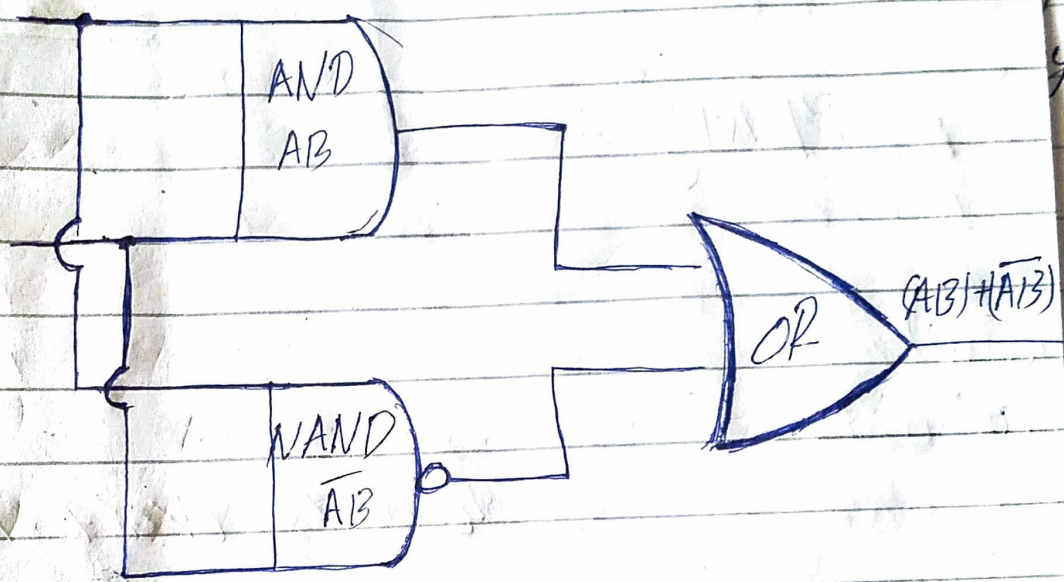
Ans

c) Ans

$= (A+B)C$ Ans

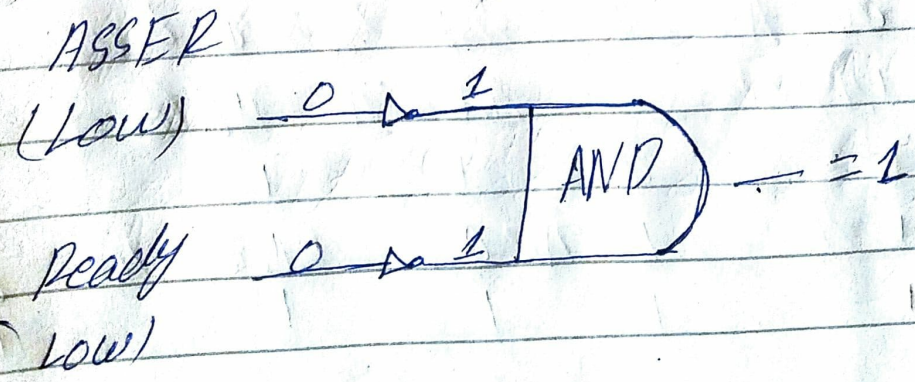
Q.8)

Ans



Q.9)

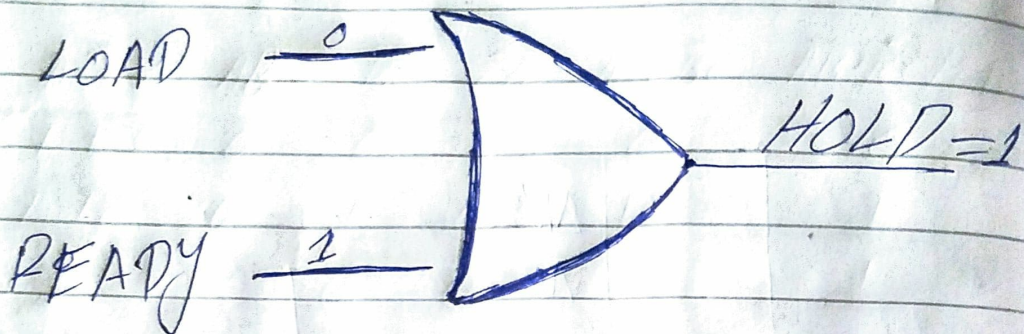
a) Ans



1 = ENABLE.

(6)

b) Ans



Q10)

a) Ans

$$P_{\text{decode}} = (V_{\text{CR}} + \text{CAMI}) \text{RDY}$$

VCR	CAMI	RDY	$V_{\text{CR}} + \text{CAMI}$	$(V_{\text{CR}} + \text{CAMI}) \text{RDY}$
0	0	0	0	0
0	0	1	0	0
0	1	0	1	0
0	1	1	1	1
1	0	0	1	0
1	0	1	1	1
1	1	0	1	0
1	1	1	1	1

Ans

(8)

b) ANS

A	B	C	\bar{A}	\bar{B}	\bar{C}	$\bar{A}\bar{B}$	$\bar{B}\bar{C}$	$\bar{C}\bar{A}$	$\bar{A}\bar{B} + \bar{B}\bar{C}$	$\bar{A}\bar{B} + \bar{B}\bar{C} + \bar{C}\bar{A}$
0	0	0	1	1	1	0	0	0	0	0
0	0	1	1	1	0	0	1	0	1	1
0	1	0	1	0	1	1	0	0	1	1
0	1	1	1	0	0	1	0	0	1	1
1	0	0	0	1	1	0	0	1	0	1
1	0	1	0	1	0	1	1	1	1	1
1	1	0	0	0	1	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0	0

~~Ans~~

Q12

a) ANS

$$A(A+B)$$

$$AA + AB \Rightarrow \text{Distributive Law}$$

$$A + AB \Rightarrow AA = A \text{ Rule 7}$$

$$A \Rightarrow A + AB = A \text{ Rule 10}$$

Ans

(9)

b) Ans.

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

$$A(A + B) \Rightarrow A + \bar{A}B \Rightarrow A + B \text{ Rule 11}$$

$$AA + AB \Rightarrow \text{Distributive Law}$$

$$A + AB \Rightarrow \text{Rule 7 } AA = A$$

$$A \Rightarrow \text{Rule 10, } A + AB \Rightarrow A$$

Ans.

c) Ans.

$$BC + \bar{B}C$$

$$CC \Rightarrow A + \bar{A} = 1 \text{ Rule 6.}$$

$$C \Rightarrow AA = A \text{ Rule 7}$$

Ans.

d) Ans.

sum as b

$$ABC + \bar{A}BC + A\bar{B}C$$

$$A\bar{B}C + \bar{A}BC + A\bar{B}C \Rightarrow \text{Permanenz}$$

$$(AA) (\bar{B}C + ABC) \Rightarrow \text{Defekt } \bar{B}C \text{ (distributiv)}$$

$$\cancel{ABC} (\bar{B}C) + \bar{A}BC \Rightarrow AA = 1 \text{ Rule 6.}$$

$$\bar{B}C + \bar{A}BC = A + \bar{A} = A \cdot 1 = A \text{ Rule 4}$$

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

$$\bar{A}C + BC \Rightarrow \text{Distributive Law}$$

(f) ?

Aus

W)

$$\bar{A}\bar{B} + \bar{A}\bar{B}C + \bar{A}\bar{B}CD + \bar{A}\bar{B}CDE$$

$$\bar{A}\bar{B}(1+C) + \bar{A}\bar{B}CD + \bar{A}\bar{B}CDE \quad \bar{A}\bar{B} \text{ common}$$

$$\bar{A}\bar{B}(1) + \bar{A}\bar{B}CD + \bar{A}\bar{B}CDE \quad 1+C = \text{Rule 2.}$$

$$\bar{A}\bar{B}(1+CD) + \bar{A}\bar{B}CDE \quad \bar{A}\bar{B} \text{ common}$$

$$\bar{A}\bar{B}(1) + \bar{A}\bar{B}CDE \quad 1+CD = 1 \text{ Rule 2}$$

(11)

$$A\bar{B} (1+CDE)$$

$A\bar{B}$ common

$$A\bar{B} (1)$$

$1+CDE = 1$ Rule 9

$$A\bar{B} \underline{\underline{A\bar{B}}}$$

Q13)

a) ~~_____~~
$$= (C\bar{D}) + B) A + \bar{A}\bar{B}C = C\bar{D}A + BA + \bar{A}\bar{B}C$$

b) ~~_____~~
$$= (A\bar{B}) + (AC\bar{D}) + (A\bar{B}C) \Rightarrow (A\bar{B}) + (AC\bar{D})$$

c) ~~_____~~
$$= (C\bar{D}\bar{B})\bar{B} + A\bar{B}$$

d) ~~_____~~
$$= (A\bar{B}) + ACD$$

"b" and "d" are equivalent

Q14)

Ans

a) $(C+D)(A+\bar{D}) \quad (A+\bar{D})(C+D)$

$$CA + C\bar{D} + DA + D\bar{D}$$

$$C\bar{D} + CA + DA + 0 \Rightarrow D\bar{D} = 0 \text{ Rule 8}$$

$$C\bar{D} + AD(1+C) \Rightarrow \text{Factor AD}$$

$$C\bar{D} + AD(1) \Rightarrow 1+C = 1 \text{ Rule 2}$$

$$(C\bar{D}) + AD$$

Ans

b)

$$(A+C)(CD+AC)$$

$$ACD + AAC + CCD + ACC$$

$$ACD + AC + CD + AC \Rightarrow AA = A \text{ Rule 7}$$

$$ACD + AC + A\cancel{C} + CD$$

$$ACD + AC + CD \Rightarrow AC + AC = AC \text{ 7.}$$

$$AC(1+D) + CD \Rightarrow \text{Factor AC}$$

$$AC(1) + CD \Rightarrow 1+0 = 1 \text{ Rule 2}$$

$$(AC) + CD$$

Ans

c) ANS

$$B+C[B\bar{D}+(C+\bar{D})E]$$

$$B+C[B\bar{D}+(CE+\bar{D}E)] \text{ distributive}$$

$$B+C[B\bar{D}+CE+\bar{D}E]$$

$$B+C(\cancel{BE} + \bar{D}) + CE$$

$$B+C(BE + \bar{D}) + CE \Rightarrow \text{Factor } BE'$$

$$B+C(BE + \bar{D}) + CE \Rightarrow A + \bar{A} = 1 \text{ Rule 6.}$$

$$B+C(BE + CE)$$

$$B+C(CE + \bar{D}) \Rightarrow 1 + B = 1 \text{ Rule 2.}$$

$$B+C(CE)$$

$$B+CC \Rightarrow \text{distributive law}$$

$$B+CE \Rightarrow CC = C \text{ Rule 7.}$$

ANS

d) ANS

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

$$A\bar{D}+AC \Rightarrow \text{distributive law}$$

$$A\bar{D}+AC \Rightarrow AA = A \text{ Rule 7}$$

ANS

e) Aus

$$BC + DE (B\bar{C} + DE)$$

$$BC + DE (BC + DE)$$

$$BC + DE B\bar{C} + DE DE \Rightarrow \text{Distributive Law}$$

$$BC + DE B\bar{C} + DE \Rightarrow DE DE = DE \text{ Rule 7}$$

$$BC + DE (1 + B\bar{C}) = \text{Factor DE}$$

$$BC + DE (1) = 1 + B\bar{C} = 1 \text{ Rule 2}$$

$$BC + DE \text{ Ans}$$

f) Aus

$$BC (\bar{C}\bar{D} + CE)$$

$$BC\bar{C}\bar{D} + BCCE \Rightarrow \text{distributive law}$$

$$B\bar{D} (C\bar{C}) + BE (CC) \Rightarrow \text{Rearranged}$$

$$B\bar{D} (0) + BE (1) \Rightarrow C\bar{C} = 0 \text{ Rule 8}$$

$$CC = C \text{ Rule 7}$$

$$BCE \text{ Ans}$$

(15)

1) Ans

$$C\bar{D} + \bar{A}D$$

$C\bar{D}$ is missing A
 $= C\bar{D} = C\bar{D}(A + \bar{A}) \Rightarrow C\bar{D}A + C\bar{D}\bar{A}$

$\bar{A}D$ is missing C
 $= \bar{A}D = \bar{A}D(C + \bar{C}) \Rightarrow \bar{A}DC + \bar{A}D\bar{C}$

$$C\bar{D}A + C\bar{D}\bar{A} + \bar{A}DC + \bar{A}D\bar{C}$$

Ans

2) Ans

$$(AC) + (CD)$$

AC is missing D
 $= AC = AC(D + \bar{D}) \Rightarrow ACD + AC\bar{D}$

CD is missing A
 $= CD = CD(A + \bar{A}) \Rightarrow CDA + CD\bar{A}$

$$ACD + AC\bar{D} + CDA + CD\bar{A}$$

Ans

c) Ans

$B + CE$

B is missing C and E

$$\Rightarrow B = B(C + \bar{C}) = BC + B\bar{C}$$

$$\Rightarrow BC = BC(E + \bar{E}) \Rightarrow BCE + B\bar{C}E$$

CE is missing B

$$\Rightarrow CE \Rightarrow CE(B + \bar{B}) \Rightarrow ECB + CE\bar{B}$$

$$BCE + B\bar{C}E + BCE + B\bar{C}E + ECB + CE\bar{B}$$

Ans

c1) Ans

$A\bar{D} + AC$

$A\bar{D}$ is missing C

$$\Rightarrow A\bar{D} = A\bar{D}(C + \bar{C}) \Rightarrow A\bar{D}C + A\bar{D}\bar{C}$$

AC is missing D

$$\Rightarrow AC = AC(D + \bar{D}) \Rightarrow ACD + AC\bar{D}$$

$$A\bar{D}C + A\bar{D}\bar{C} + ACD + AC\bar{D}$$

e) Ans

$$BC + DE$$

BC is missing E and D

$$\Rightarrow BC = BC(D + \bar{D}) \Rightarrow BCD + BC\bar{D}$$

$$\Rightarrow BCD = BCD(E + \bar{E}) \Rightarrow BCDE + BC\bar{E}D$$

$$\Rightarrow BC\bar{D} = BC\bar{D}(E + \bar{E}) \Rightarrow BC\bar{D}E + BC\bar{D}\bar{E}$$

DE missing BC

$$\Rightarrow DE = DE(B + \bar{B}) = DEB + DE\bar{B}$$

$$\Rightarrow DEB = DEB(C + \bar{C}) = DEBC + DEB\bar{C}$$

$$\Rightarrow DE\bar{B} = DE\bar{B}(C + \bar{C}) = DE\bar{B}C + DE\bar{B}\bar{C}$$

$$BCDE + BCDE + BC\bar{D}E + BC\bar{D}\bar{E} + DEBC + DEB\bar{C} + DE\bar{B}C + DE\bar{B}\bar{C}$$

Ans

f) Ans

$$BCE$$

BCE is in standard SOP form.

Q16)

a) Ans.

$$C\bar{D}A + C\bar{D}\bar{A} + ADC + AD\bar{C}$$

soln

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

Ans.b) Ans.

$$ACD + AC\bar{D} + CDA + C\bar{D}A$$

soln.

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

Ans.c) Ans.

$$BCE + B\bar{C}\bar{E} + B\bar{C}E + B\bar{C}\bar{E} + CE\bar{B} + CE\bar{B}$$

soln.

$$(B + C + E)(B + C + \bar{E})(B + \bar{C} + E)(B + \bar{C} + \bar{E})(C + E + B)(C + E + \bar{B})$$

Ans.d) Ans.

$$A\bar{D}C + A\bar{D}\bar{C} + ACD + AC\bar{D}$$

soln.

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

Ans.

e)

Ans

$$BC\bar{D}\bar{E} + BCDE + BC\bar{D}E + BC\bar{D}\bar{E} + DEBC + DE\bar{B}\bar{C} \\ + DE\bar{D}C + DE\bar{B}\bar{C}$$

soln.

$$(B+C+D+E)(B+C+D+E)(B+C+\bar{D}+E)(B+C+\bar{D}+\bar{E})$$

$$(D+E+B+C)(D+E+B+\bar{C})(D+E+\bar{D}+C)(D+E+\bar{D}+\bar{C})$$

Ans

f)

Ans

$$BCE$$

$$(B+C+E)$$

Ans

Q17):

a) Ans

A	C	D	X	
0	0	0	0	
0	0	1	0	
0	1	0	1	$\bar{A}C\bar{D}$
0	1	1	0	
1	0	0	0	
1	0	1	1	$A\bar{C}D$
1	1	0	1	$A\bar{C}\bar{D}$
1	1	1	1	ACD

b)

A	C	D	X	
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	1	$\bar{A}CD$
1	0	0	0	
1	0	1	0	
1	1	0	1	$\bar{A}C\bar{D}$ $AC\bar{D}$
1	1	1	1	ACD

c)

B	C	E	X	
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	1	$\bar{B}CE$
1	0	0	1	$B\bar{C}\bar{E}$
1	0	1	1	$B\bar{C}E$
1	1	0	1	$BC\bar{E}$
1	1	1	1	BCE

d)

A	C	D	X	
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	0	
1	0	0	1	$A\bar{C}\bar{D}$
1	0	1	0	$A\bar{C}D$
1	1	0	1	$AC\bar{D}$
1	1	1	1	ACD

(21)

c)

B	C	E	X	
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	1	$\bar{B}CE$
1	0	0	1	$B\bar{C}\bar{E}$
1	0	1	1	$B\bar{C}E$
1	1	0	1	$BC\bar{E}$
1	1	1	1	BCE

d)

A	C	D	X	
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	0	
1	0	0	1	$A\bar{C}\bar{D}$
1	0	1	0	$A\bar{C}D$
1	1	0	1	$AC\bar{D}$
1	1	1	1	ACD

c) BCDEX

sol:

B	C	D	E	X	
0	0	0	0	0	
0	0	0	1	0	
0	0	1	0	0	
0	0	1	1	1	$\bar{B}\bar{C}DE$
0	1	0	0	0	
0	1	0	1	0	
0	1	1	0	0	
0	1	1	1	1	$\bar{B}CDE$
1	0	0	0	0	
1	0	0	1	0	
1	0	1	0	0	
1	0	1	1	1	$B\bar{C}DE$
1	1	0	0	1	$BCDE$
1	1	0	1	1	$BCDE$
1	1	1	0	1	$BCD\bar{E}$
1	1	1	1	1	$BCDE$

f)

B	C	E	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

BCE.

Q18)

a) Ans

A	C	D	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

(A+C+D)

(A+C+D̄)

(Ā+C+D̄)

(A+C̄+D)

b)

B	C	E	X	
0	0	0	0	$(B+C+E)$
0	0	1	0	$(B+C+\bar{E})$
0	1	0	0	$(B+\bar{C}+E)$
0	1	1	0	$(B+\bar{C}+\bar{E})$
1	0	0	0	$(\bar{B}+C+E)$
1	0	1	1	
1	1	0	1	
1	1	1	1	

c)

A	C	D	X	
0	0	0	0	$(A+C+D)$
0	0	1	0	$(A+C+\bar{D})$
0	1	0	1	
0	1	1	0	$(A+\bar{C}+\bar{D})$
1	0	0	1	
1	0	1	1	
1	1	0	1	
1	1	1	1	

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e)	B	C	D	E	X
	0	0	0	0	0 $(B+C+D+E)$
	0	0	0	1	0 $(B+C+D+\bar{E})$
	0	0	1	0	0 $(B+C+\bar{D}+E)$
	0	0	1	1	0 $(B+C+\bar{D}+\bar{E})$
	0	1	0	0	0 $(B+\bar{C}+D+E)$
	0	1	0	1	1
	0	1	1	0	1
	0	1	1	1	1
	1	0	0	0	0 $(\bar{B}+C+D+E)$
	1	0	0	1	1
	1	0	1	0	1
	1	0	1	1	1
	1	1	0	0	0 $(\bar{B}+\bar{C}+D+E)$
	1	1	0	1	1
	1	1	1	0	1
	1	1	1	1	1

f)	B	C	E	X
	0	0	0	0 $(B+GE)$
	0	0	1	1
	0	1	0	1
	0	1	1	1
	1	0	0	1
	1	0	1	1
	1	1	0	1
	1	1	1	1

Q 19)

Ans

A	B	C	D	X	
0	0	0	0	1	$(\bar{A}\bar{B}\bar{C}\bar{D})$
0	0	0	1	1	$(\bar{A}\bar{B}\bar{C}D)$
0	0	1	0	0	$(\bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C}D)$
0	0	1	1	1	$(\bar{A}\bar{B}CD)$
0	1	0	0	0	$(A + \bar{B} + C + D)$
0	1	0	1	1	$(\bar{A}B\bar{C}D)$
0	1	1	0	1	$(\bar{A}BC\bar{D})$
0	1	1	1	0	$(A + \bar{B} + C + \bar{D})$
1	0	0	0	0	$(\bar{A} + \bar{B} + C + D)$
1	0	0	1	1	$(A\bar{B}\bar{C}D)$
1	0	1	0	0	$(\bar{A} + B + \bar{C} + D)$
1	0	1	1	0	$(\bar{A} + B + \bar{C} + \bar{D})$
1	1	0	0	1	$(A\bar{B}\bar{C}\bar{D})$
1	1	0	1	0	$(\bar{A} + \bar{B} + C + \bar{D})$
1	1	1	0	0	$(\bar{A} + \bar{B} + \bar{C} + D)$
1	1	1	1	0	$(\bar{A} + \bar{B} + \bar{C} + \bar{D})$

Q20:

Aus.

a) $\bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C}$
 000 001 010

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

AB \ C	0	1
00	1	1
11		
10		1
11		

Aus

b) $AC(\bar{B}+C) = AC\bar{B} + AC$

AC missing B.

$\Rightarrow AC = AC(B + \bar{B}) \Rightarrow ACB + AC\bar{B}$

$\Rightarrow AC\bar{B} + ACB + AC\bar{B} = AC\bar{B} + ACB = AC\bar{B}$

$\Rightarrow AC\bar{B} + ACB$
 110 111

AC \ B	0	1
00		
01		
10	1	1
10		

$\Rightarrow AC$ AK

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

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

$$011 \quad 010 \quad 111 \quad 110$$

AB	C	0	1
00			
01		1	1
11		1	1
10			

= (B) Ans

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

$$000 \quad 100 \quad 000 \quad 110$$

AB	C	0	1
00		1	
01		1	
11		1	
10		1	

= (C) Ans

$$e) A + B \bar{C} + C D$$

A is missing BCD'

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

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

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

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

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$$ABC = ABC(D+\bar{D}) = ABCD + ABC\bar{D} \text{ (i)}$$

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

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

$B\bar{C}$ is missing AB .

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

$$B\bar{C}\bar{A} = B\bar{C}\bar{A}(D+\bar{D}) \Rightarrow B\bar{C}\bar{A}D + B\bar{C}\bar{A}\bar{D} \text{ (i)}$$

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

CD is missing AB .

$$AB = AB(C+\bar{C}) \Rightarrow ABC + AB\bar{C}$$

$$ABC = ABC(D+\bar{D}) \Rightarrow ABC\bar{D} + ABCD \text{ (i)}$$

$$AB\bar{C} = AB\bar{C}(D+\bar{D}) \Rightarrow AB\bar{C}D + AB\bar{C}\bar{D} \text{ (ii)}$$

$$= \begin{matrix} A\bar{B}CD & A\bar{B}C\bar{D} & ABCD & A\bar{B}C\bar{D} & A\bar{B}\bar{C}D \\ 1011 & 1010 & 1111 & 1110 & 1001 \end{matrix}$$

$$+ \begin{matrix} A\bar{B}\bar{C}\bar{D} & AB\bar{C}D & AB\bar{C}\bar{D} & B\bar{C}AD \\ 1000 & 1100 & 1100 & 1011 \end{matrix}$$

$$+ \begin{matrix} B\bar{C}A\bar{D} & B\bar{C}A\bar{D} & AB\bar{C}\bar{D} & A\bar{B}CD \\ 1010 & 1000 & 1110 & 1111 \end{matrix}$$

$$+ \begin{matrix} A\bar{B}\bar{C}D & A\bar{B}\bar{C}\bar{D} \\ 1101 & 1100 \end{matrix}$$

303

AB \ CD	00	01	11	10
00	1	1		
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

$= (\bar{A}\bar{B}) + (AB)$
Answer

f) $\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}B\bar{C}\bar{D}$

AB \ CD	00	01	11	10
00	1	1		
01				
11			1	1
10				

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

g) ?) (sorry)

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

$= \bar{A}B\bar{C}\bar{D} + \bar{A}B\bar{C}D + AB\bar{C}\bar{D} + AB\bar{C}D + A\bar{B}\bar{C}D$
 0100 0101 1100 1101 1001

AB \ CD	00	01	11	10
00				
01	1	1		
11			1	1
10		1		

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

Answer

Q 21)

Ans

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

000 001 011 101 111

	AB	C	
		0	1
0	0	1	1
0	1		1
1	1		1
1	0		1

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

Q 22)

Ans

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

0001 0010 0110 0111

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

1000 1010 1100 1101

$$+ ABCD$$

1111

	AB	CD			
		00	01	11	10
0	0		1		1
0	1			1	1
1	1	1	1		
1	0	1			

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

Ans

Q 93

Ans

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

0 0 0 1 1 1 0 1 0

AB	C	
	0	1
00	0	
01	0	
11		0
10		

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

Ans

b) $(x + \bar{y}) (\bar{x} + z) (x + \bar{y} + z) (\bar{x} + \bar{y} + z)$

$x + \bar{y}$ is missing z

$$x + \bar{y} = x + \bar{y} + (z\bar{z}) = (x + \bar{y} + z) (\bar{x} + \bar{y} + z) \text{ (1)}$$

~~$x + \bar{y}$~~

$\bar{x} + z$ is missing y

$$\bar{x} + z = \bar{x} + z + (y\bar{y}) = (\bar{x} + y + z) (\bar{x} + \bar{y} + z) \text{ (2)}$$

$$\Rightarrow (x + \bar{y} + z) (x + \bar{y} + \bar{z}) (\bar{x} + y + z)$$

$$0 \ 1 \ 0 \quad 0 \ 1 \ 1 \quad 1 \ 0 \ 0$$

$$(\bar{x} + \bar{y} + z) + (x + \bar{y} + z) (\bar{x} + \bar{y} + z)$$

$$1 \ 1 \ 0 \quad 0 \ 1 \ 0 \quad 1 \ 1 \ 0$$

xy	z	1
00	0	
01	0	0
11	0	
10	0	0

$$\Rightarrow (x + \bar{y})(z) (\bar{x} + \bar{y})$$

Answer

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

A is missing B+C.

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

B+C is missing A.

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

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

$$0 \ 0 \ 0 \quad 0 \ 1 \ 0 \quad 0 \ 0 \ 1 \quad 0 \ 1 \ 1 \quad 0 \ 0 \ 1$$

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

$$0 \ 0 \ 0 \quad 0 \ 1 \ 0 \quad 1 \ 0 \ 1$$

AB	C	0	1
00	0	0	0
01	0	0	0
11	0		
00	0		0

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

Answer

~~Q 23)~~

Q 24)

Ans

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

$$010 \quad 110$$

AB	C	0	1
00			
01		1	
11			
10		1	

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

Ans

Q 25)

Ans

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

$$0000 \quad 1100 \quad 0100$$

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

$$0101 \quad 0110 \quad 1011 \quad 1110$$

AB	CD	00	01	11	10
00		1		0	
01		1	1		
11					0
10			1	1	

~~Ans~~

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

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

Ans

Q 26)

Ans

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

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

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

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

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

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

$$010 \quad 011 \quad 001 \quad 011 \quad 110$$

AB	C	
	0	1
00	1	0
01	0	0
11	0	1
10	1	1

#

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

Ans

(36)

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

$\bar{A}+B$ is missing C and D .

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

$\bar{A}+\bar{B}+\bar{C}$ is missing D .

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

$B+\bar{C}+D$ is missing A

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

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

$$1000 \quad 1010 \quad 1011 \quad 1110$$

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

$$1111 \quad 0010 \quad 1010$$

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

$$0111$$

AB	CD	00	01	11	10
00	00	1	0	0	0
01	00	1	1	0	0
11	00	1	1	0	0
10	00	1	1	0	0

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