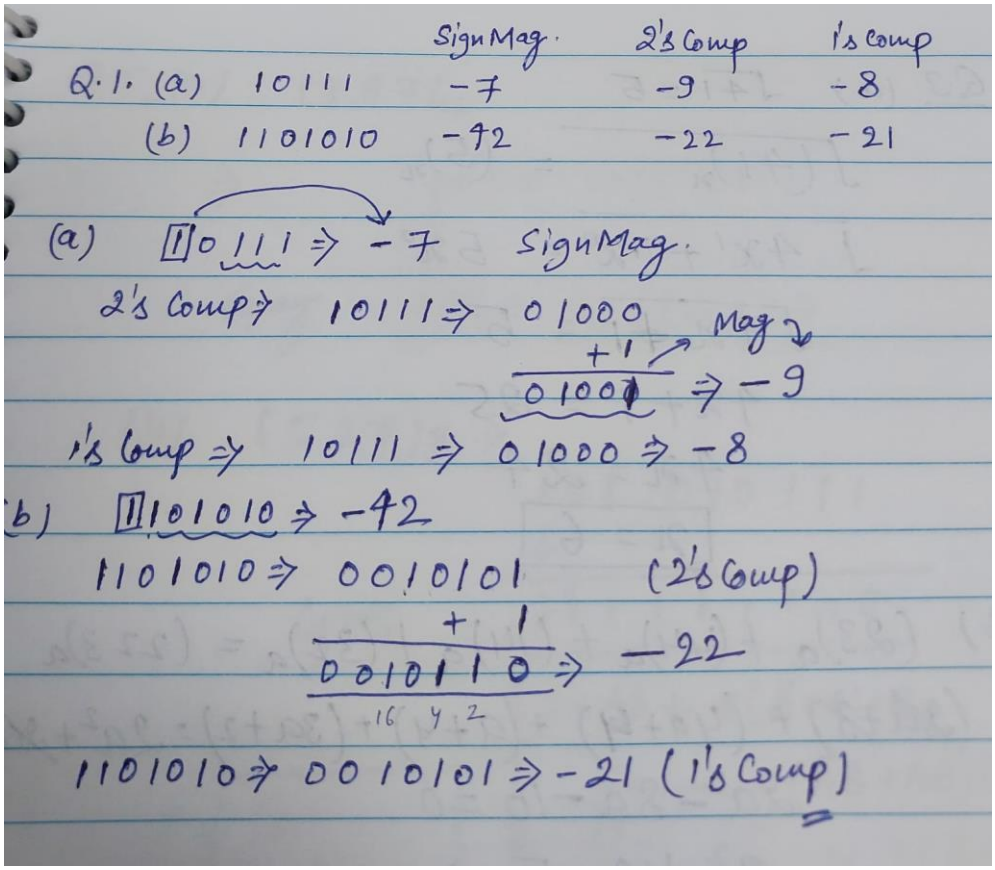
Bennett University
(SCSET)
Mid Sem Examination
CSET105
Digital Design

Max marks: 20 Max Time: 1:00 Hr.

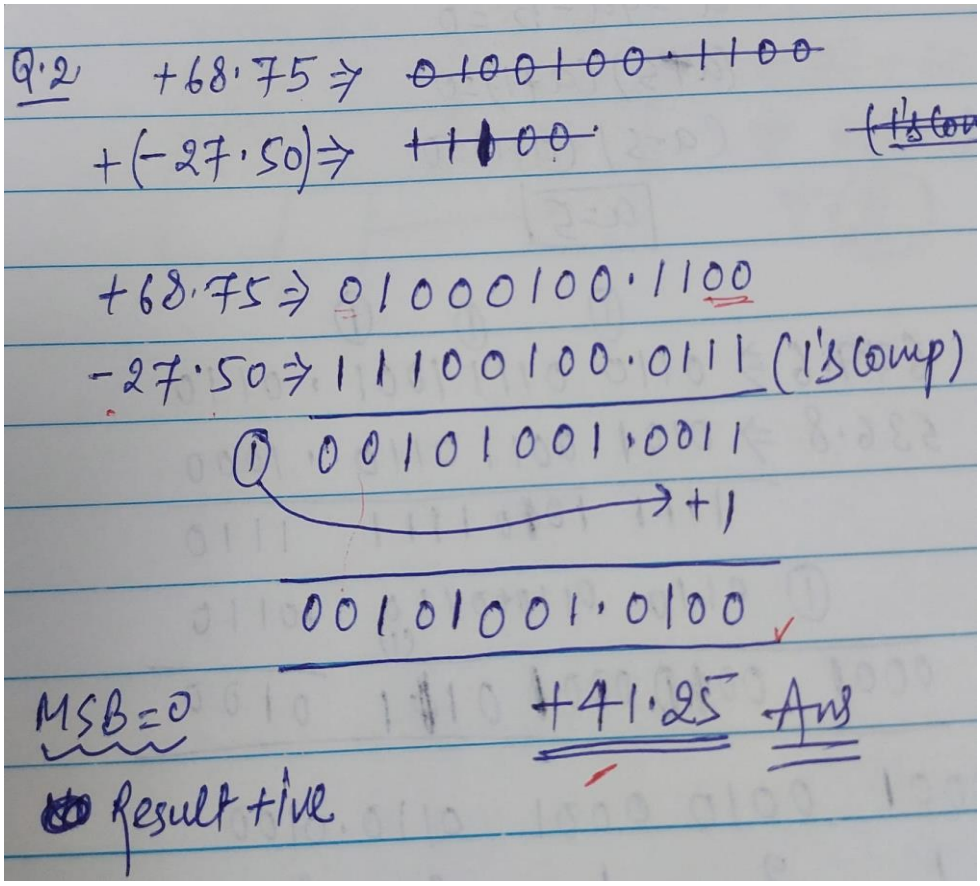
Note: Q1 to Q7 has 2 Marks each and Q8 & Q9 have 3 marks.

Q1. Each of the following number is a signed number. Determine the decimal value in each case, if they are in (1) Sign Magnitude form (2) 2's complement form (3) 1's complement form

(a) 10111
(b) 1101010



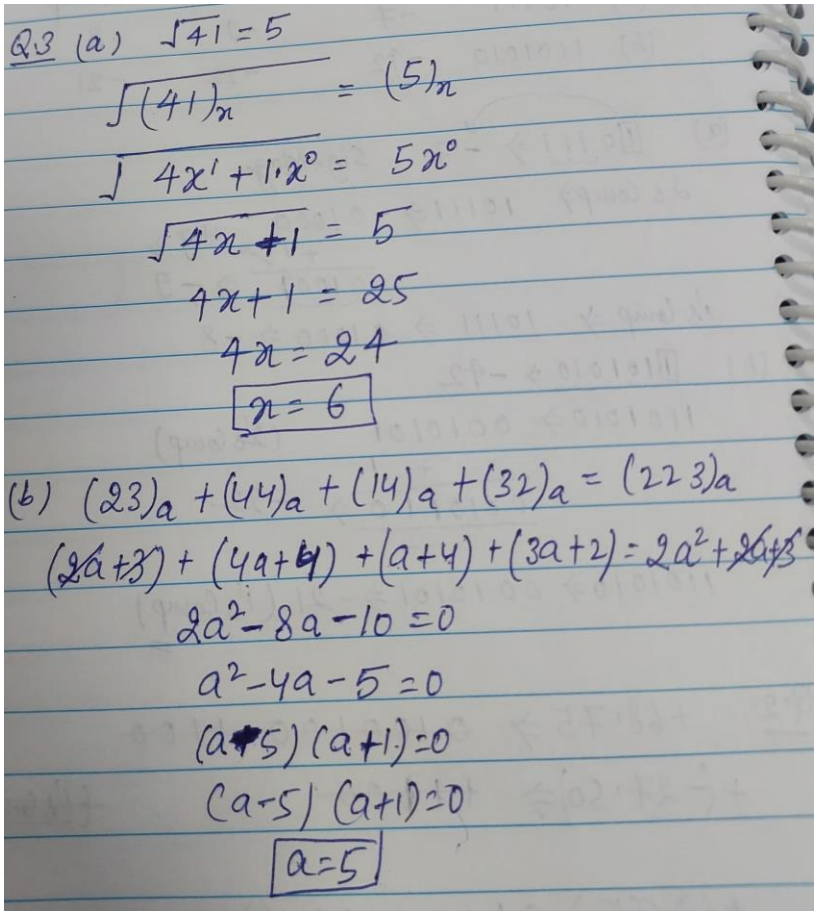
Q2. Subtract 27.50 from 68.75 using 12 bit 1's Complement arithmetic.



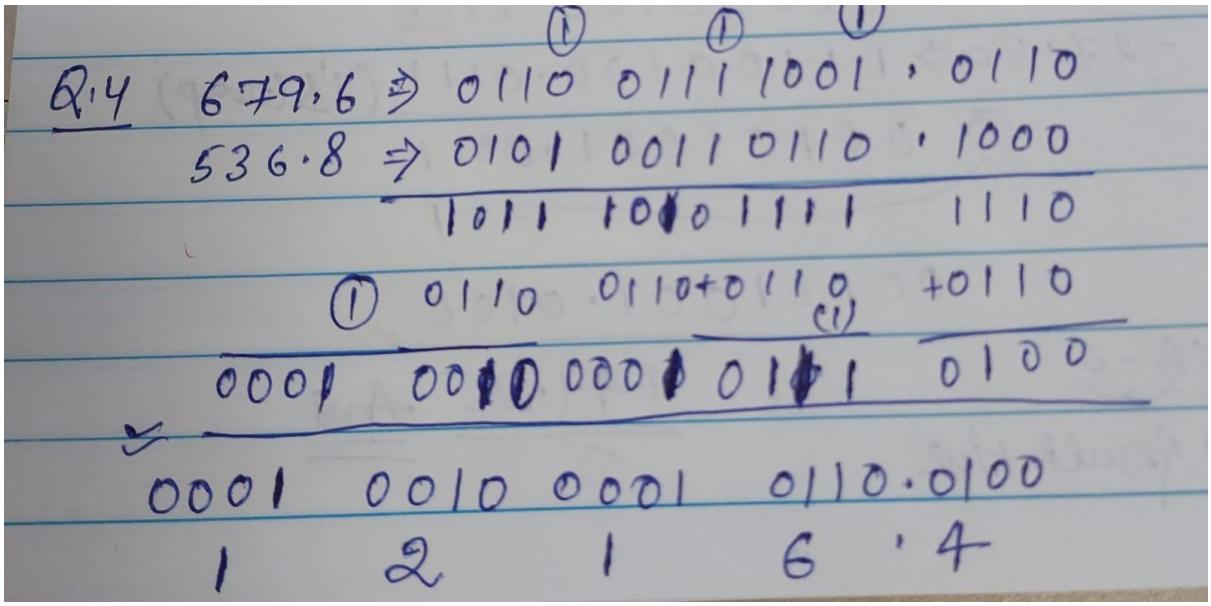
Q3. Each of the following Arithmetic operations is correct in at least one number system. Determine the possible base (Radix) in each operation.

(a) $\sqrt{41} = 5$

(b) 23 + 44 +14 +32 = 223

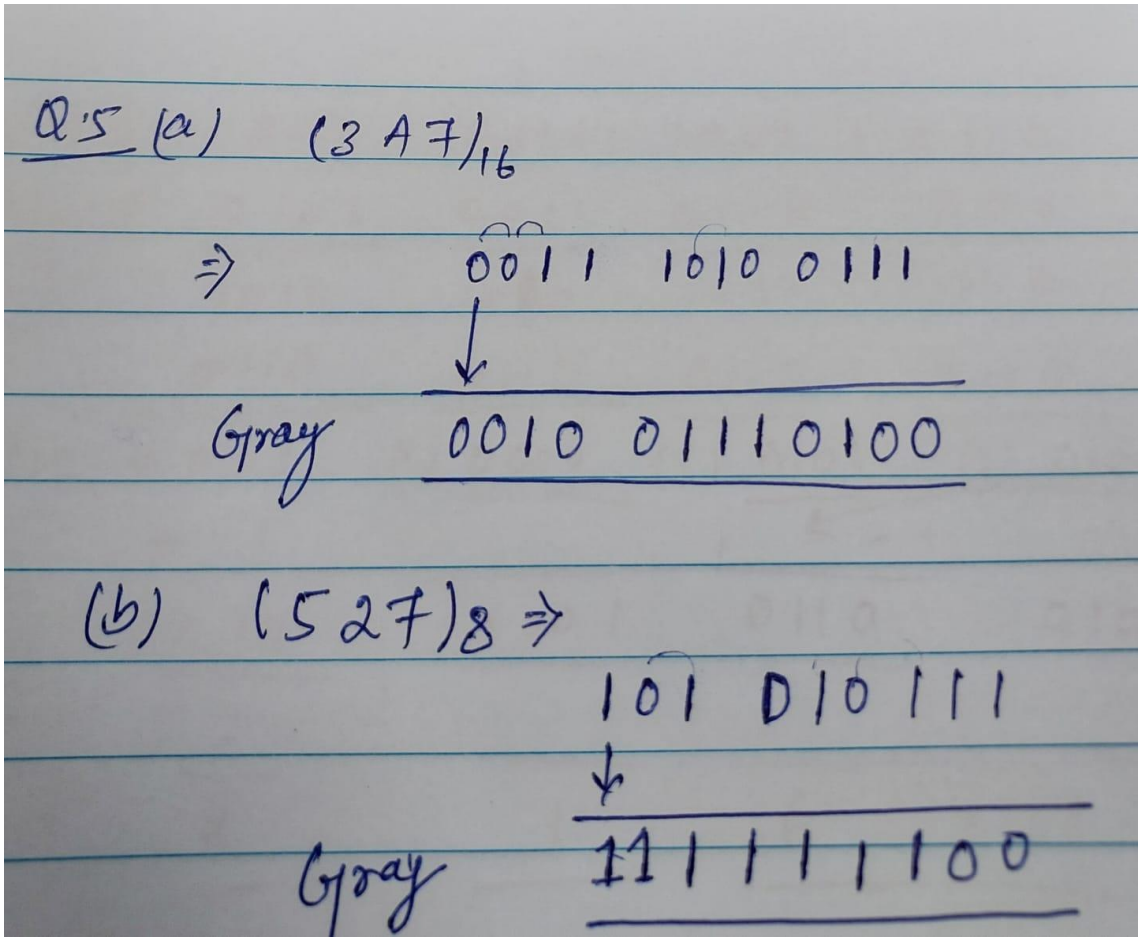


Q4. Perform decimal addition of 679.6 and 536.8 using BCD code.

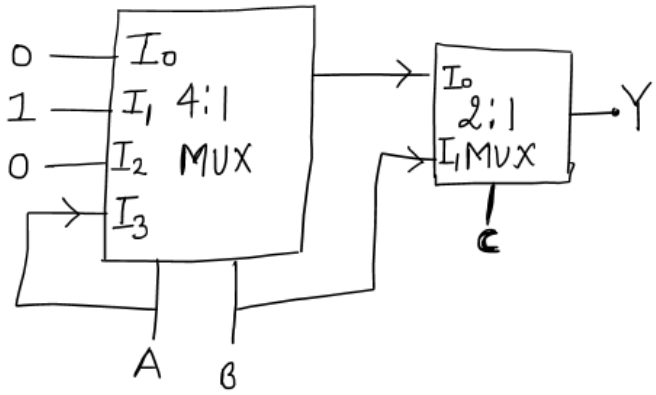


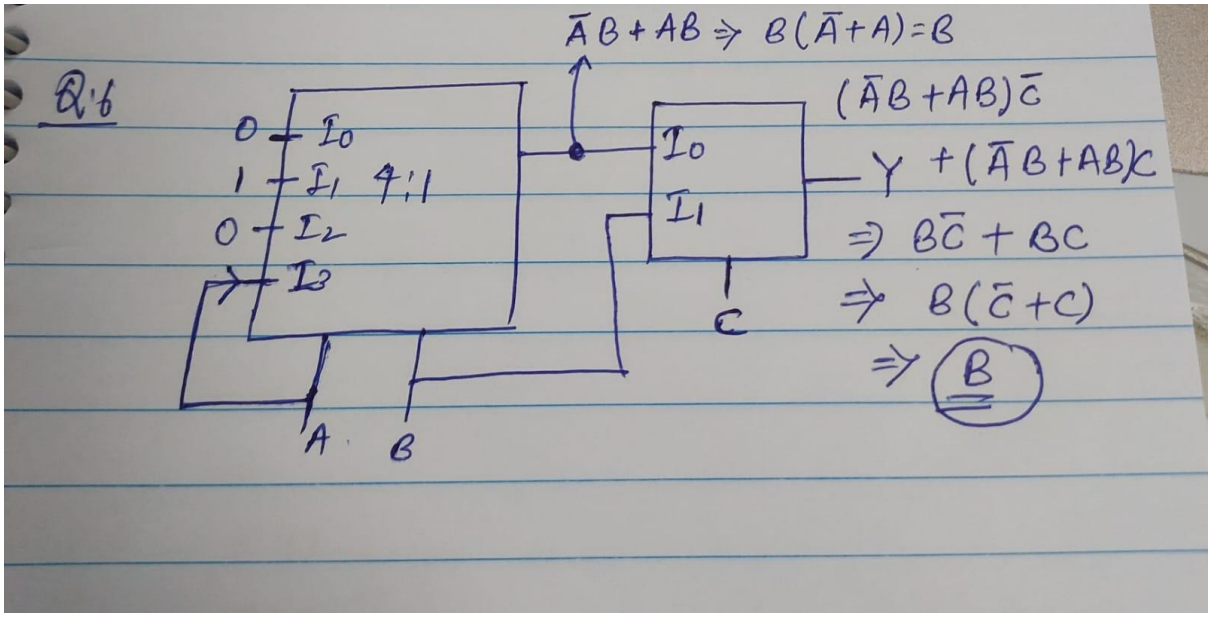
Q5. Convert the following into the gray number.

(a) $(3\ A\ 7)_{16}$
(b) $(5\ 2\ 7)_8$

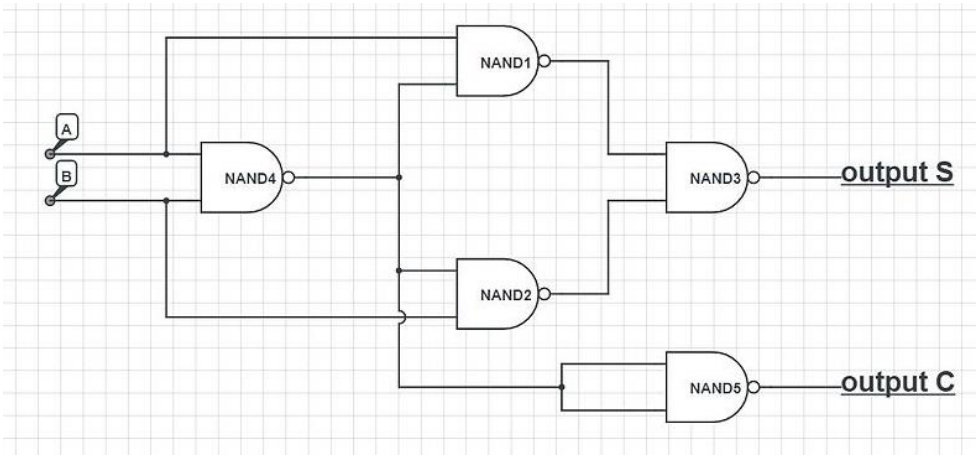


Q6. A Combination of multiplexers is given, Express the output Y.



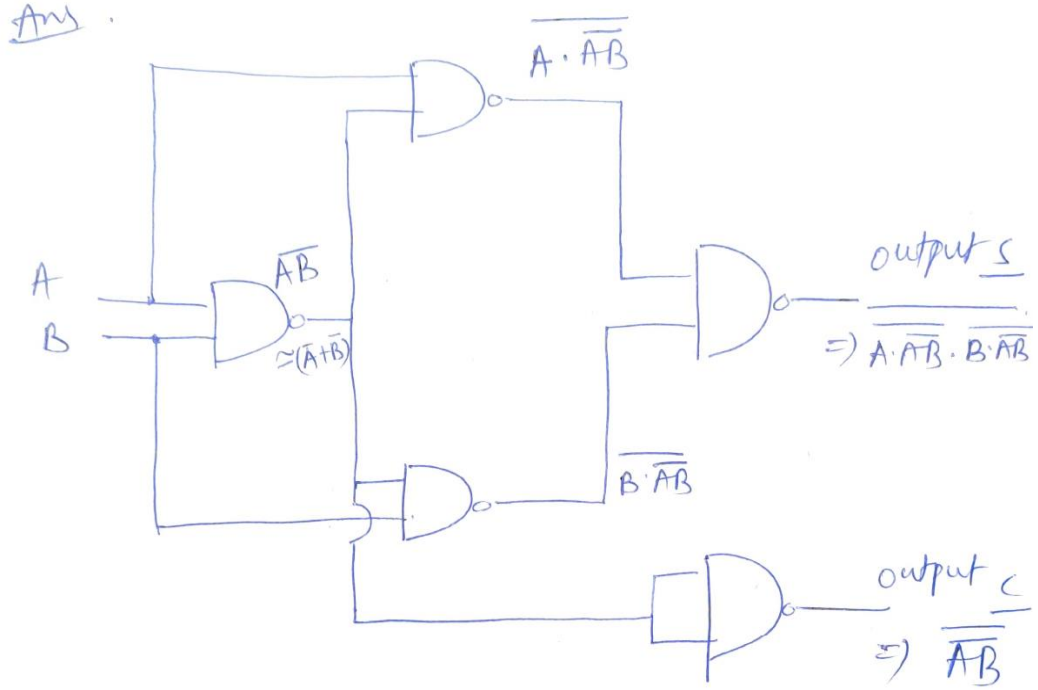


Q7. The following diagram resembles one of the combinational circuits, so calculate the output expression S and C and mention the name of circuit.



Q-7

Ans.



output expression for S

$= S \Rightarrow \overline{A \cdot \overline{A \cdot B} \cdot B \cdot \overline{AB}}$

$= (A \cdot \overline{A \cdot B}) + (B \cdot \overline{AB})$

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

$= A\bar{A} + A\bar{B} + B\bar{A} + B\bar{B}$ $\quad \{B\bar{B} = 0,\ A\bar{A} = 0$

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

$\boxed{S = A \oplus B}$ (sum expression of Half Adder)

expression for

$C = \overline{AB}$

$\boxed{C = AB}$

Q8. Implement the logic expression with 4:1 Multiplexer (Draw Multiplexer)

$$f(A, B, C) = \sum(0, 1, 2, 5)$$

(a) Choose (A B) as Select line
(b) Choose (A C) as select line

Q. 8

Ans.

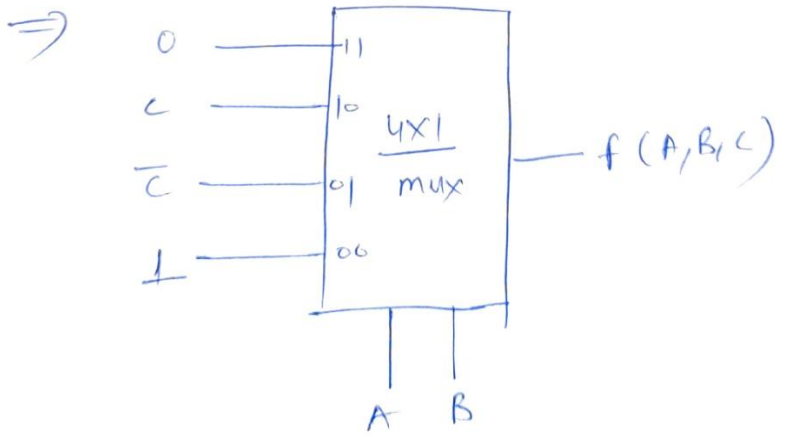
$$f(A, B, C) = \Sigma m(0, 1, 2, 5)$$

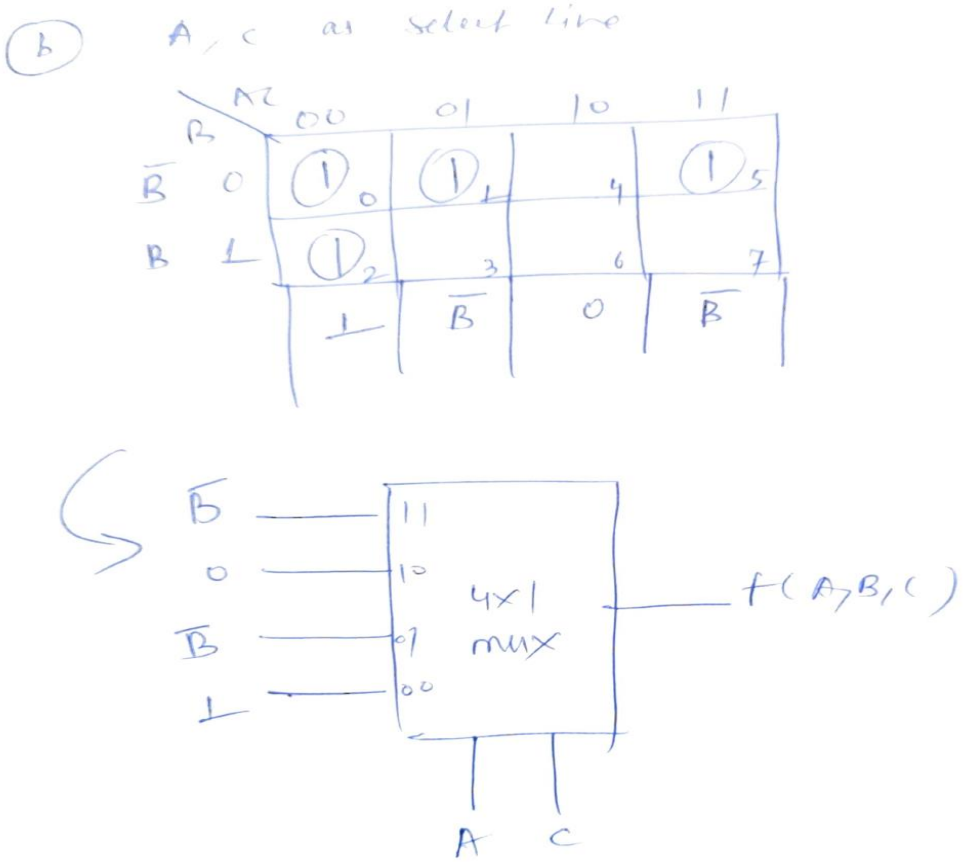
Implementation of above expr. using 4x1 mux where

(a) A, B as select line.

then

C \ AB	00	01	10	11
$\bar{C}$	1 (0)	1 (2)	4	6
C	1 (1)	3	1 (5)	7
	1	$\bar{C}$	C	0





Q9. The following truth table is given for the outputs (Z) and (Y).

Inputs				Output	Output
A	**B**	**C**	**D**	**Z**	**Y**
0	0	0	0	X	0
0	0	0	1	0	0
0	0	1	0	X	0
0	0	1	1	1	0
0	1	0	0	0	0
0	1	0	1	1	0
0	1	1	0	1	0
0	1	1	1	1	1
1	0	0	0	1	1
1	0	0	1	0	1
1	0	1	0	X	X

1	0	1	1	0	X
1	1	0	0	0	X
1	1	0	1	1	X
1	1	1	0	0	X
1	1	1	1	1	X

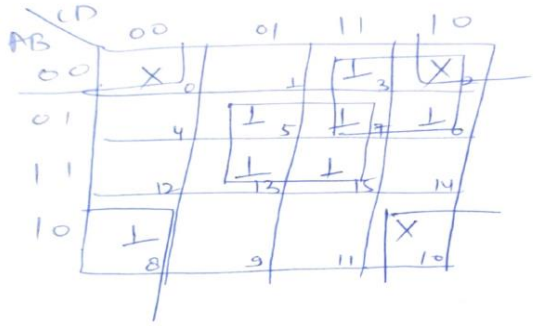
Obtained Minimized Boolean expression of Z and Y by using K-map with considering the don't care conditions.

Q-4

Soln

for Z, expression is:

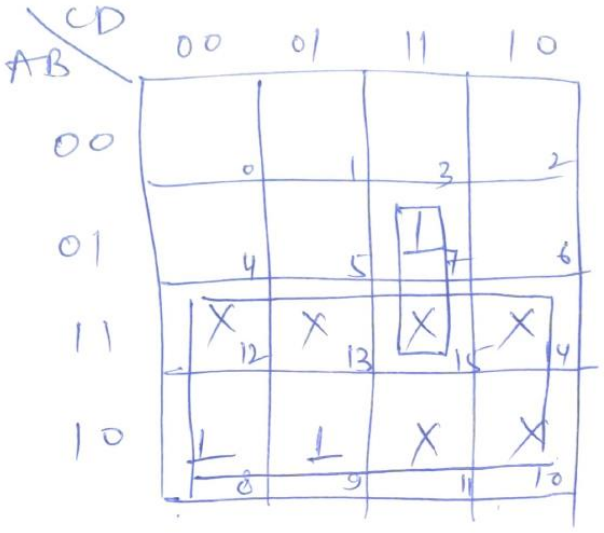
$Z(A,B,C,D) = \Sigma m(3,5,6,7,8,13,15) + \Sigma d(0,2,10)$



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

for Y, expression is :—

$Y(A,B,C,D) = \Sigma m(7,8,9) + \Sigma d(10,11,12,13,14,15)$



$Y(A, B, C, D) = \underline{A + BCD}$.