

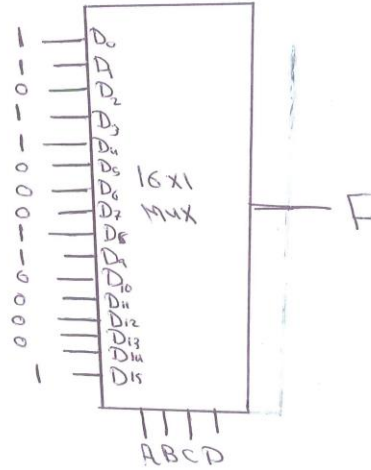
Ex: - If $F = \sum m(0, 1, 3, 4, 8, 9, 15)$, Implement it using :-

- 1- 16x1 Mux.
- 2- 8x1 Mux.
- 3- 4x1 Mux.
- 4- 2x1 Mux.

Solution: -

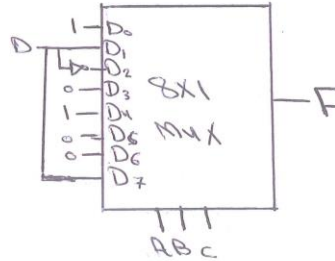
1- By using 16x1 Mux

ABCD	F
0000	1
0001	1
0010	0
0011	1
0100	1
0101	0
0110	0
0111	0
1000	1
1001	1
1010	0
1011	0
1100	0
1101	0
1110	0
1111	1



2- 8x1 Mux.

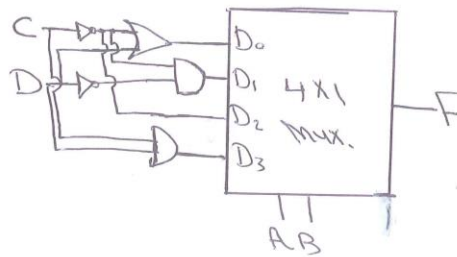
Select line input	D ₀	D ₁	D ₂	D ₃	D ₄	D ₅	D ₆	D ₇
	ABC	ABC	ABC	ABC	ABC	ABC	ABC	ABC
\bar{D}	0	2	4	6	8	10	12	14
D	1	3	5	7	9	11	13	15
result	1	D	\bar{D}	0	1	0	0	D



3- 4x1 Mux.

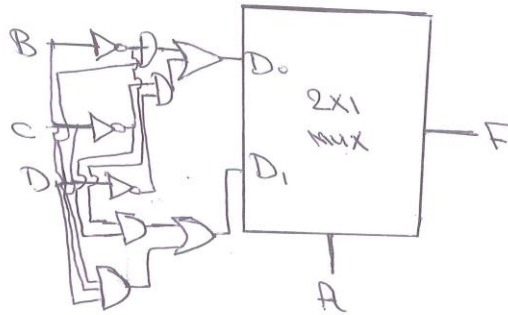
Select line input	D ₀	D ₁	D ₂	D ₃
	AB	AB	AB	AB
$\bar{C}\bar{D}$	0	4	8	12
$\bar{C}D$	1	5	9	13
$C\bar{D}$	2	6	10	14
CD	3	7	11	15
result		$\bar{C}\bar{D}$	\bar{C}	$C\bar{D}$

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



4- 2x1 Mux.

input \ SL	D ₀ A	D ₁ A
$\bar{B}\bar{C}\bar{D}$	0	8
$\bar{B}c\bar{D}$	1	9
$\bar{B}cD$	2	10
$\bar{B}\bar{C}D$	3	11
$B\bar{C}\bar{D}$	4	12
$B\bar{C}D$	5	13
$Bc\bar{D}$	6	14
BcD	7	15
result		



$$\bar{B}cD + \bar{B}c\bar{D} + \bar{B}C\bar{D} + \bar{B}CD$$

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

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

$$\bar{B}C\bar{D} + \bar{B}c\bar{D} + BcD$$

$$\bar{B}C [\bar{D} + D] + BcD$$

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

Ex:- Implement the function $F = \sum 0, 2, 4, 6, 7 + \sum d$

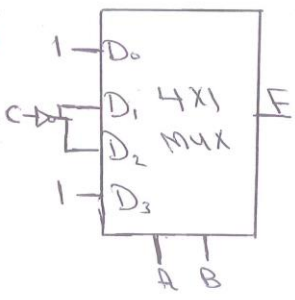
- using :-
- 1- (4x1) mux.
 - 2- (2x1) multiplexers. ((2x1) mux) (two 2x1 muxes)
 - 3- (2x1) mux (As HW)

Solution:-

1- (4x1) mux :-

ABC	F
000	1
001	x
010	1
011	0
100	1
101	0
110	1
111	1

SL	D ₀ $\bar{A}\bar{B}$	D ₁ $\bar{A}B$	D ₂ $A\bar{B}$	D ₃ AB
\bar{C}	0	2	4	6
C	1	3	5	7
result	1	\bar{C}	\bar{C}	1

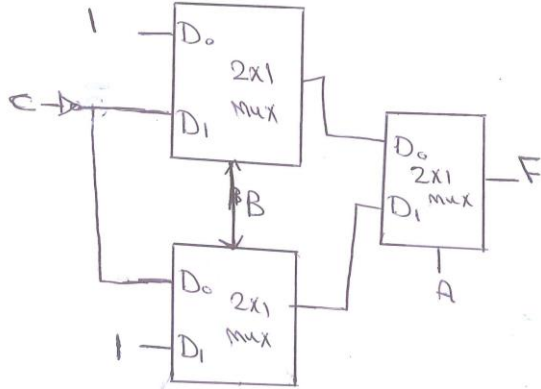


V. Imp.

2- (2x1) Multiplexers:-

2x1 MUX 9/12/1

	$\bar{A}=0$	$A=1$	
D_0	\bar{A}	A	D_1
D_1	\bar{A}	A	D_0
input	$\bar{A}B$	AB	AB
\bar{C}	0	2	4 6
C	1x	3	5 7
	1	\bar{C}	\bar{C} 1



Another way:-

A/B	\bar{C}	C	result
0/0	0	1x	1 D_0
0/1	2	3	\bar{C} D_1
1/0	4	5	\bar{C} D_0
1/1	6	7	1 D_1

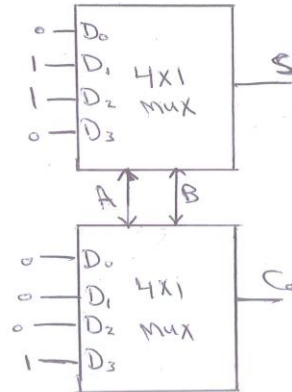
Ex:- Implement HA, using:-

- 1- Proper Mux.
- 2- 2x1 Mux.
- 3- (2x1) multiplexers.

Solution:-

AB	S	C_0
00	0	0
01	1	0
10	1	0
11	0	1

$S = \sum 1, 2$
 $C_0 = \sum 3$



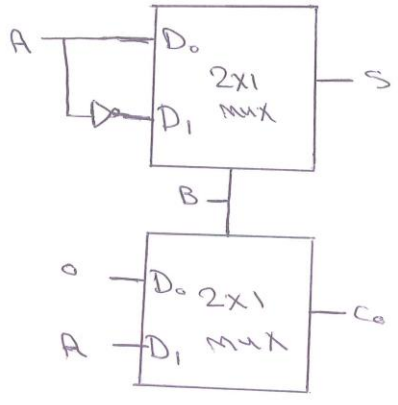
2. (2x1) MUX (Sand Co) must have the same select line.

a) for $S = \sum 1, 2$

input	\overline{B}	B
\overline{A}	0	1
A	2	3
result	A	\overline{A}

b) for $C_0 = \sum 3$

input	\overline{B}	B
\overline{A}	0	1
A	2	3
result	0	A



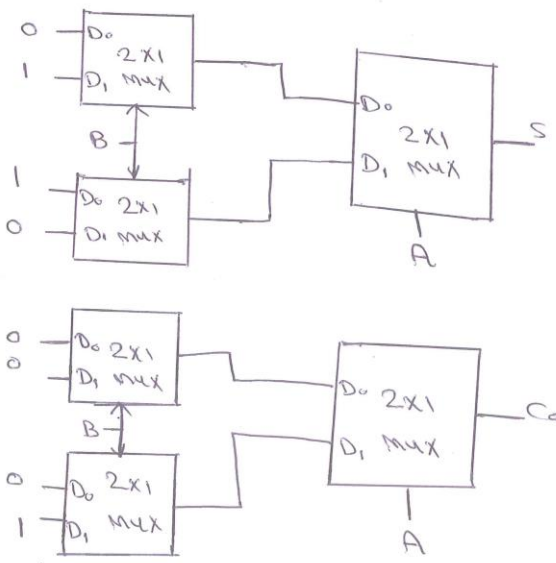
3- (2x1) Multiplexers:-

a) for S

A	B	S
0	0	0
0	1	1
1	0	1
1	1	0

b) for C_0

A	B	C_0
0	0	0
0	1	0
1	0	0
1	1	1



H.w:- Implement FA by using:-

- 1- proper MUX
- 2- 4x1 MUX
- 3- 2x1 MUX
- 4- (2x1) multiplexers.

Ex:- Implement the following function by using

(4x1 Mux) and (2x1 Mux). $F = \sum 0, 1, 3, 4, 8, 9, 15.$

Solution:-

ABCD	F
0000	1
0001	1
0010	0
0011	1
0100	1
0101	0
0110	0
0111	0
1000	1
1001	1
1010	0
1011	0
1100	0
1101	0
1110	0
1111	1

4x1 mux Need 2 select line
 2x1 mux Need 1 select line
 ∴ total no. of select line = 2+1=3

A is a select line for 2x1 mux
 Bc are select lines for 4x1 mux
 D is an input.

input	D ₀ BC	D ₁ BC	D ₂ BC	D ₃ BC
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\bar{D}	0	2	4	6
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D	1	3	5	7
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result	1	D	\bar{D}	0
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input	D ₀ BC	D ₁ BC	D ₂ BC	D ₃ BC
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\bar{D}	8	10	12	14
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D	9	11	13	15
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result	1	0	0	D
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