29/11

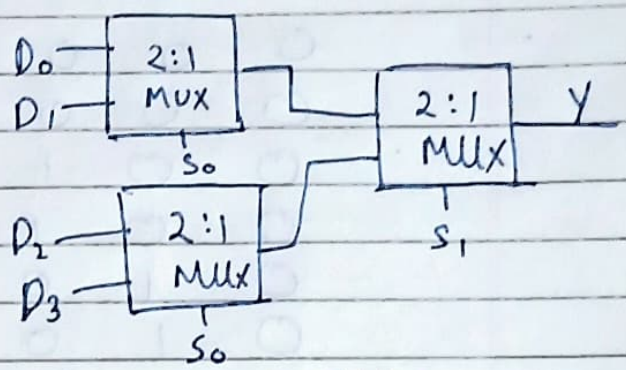
MUX Tree (6 m).

1) Obtain 4:1 MUX using 2:1 MUX.

$$n = \frac{4}{2} = 2$$
$$+ = 3$$
$$\frac{2}{2} = 1$$

(2:1) MUX are required to implement 4:1 MUX.

S_1	S_0	Y
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3

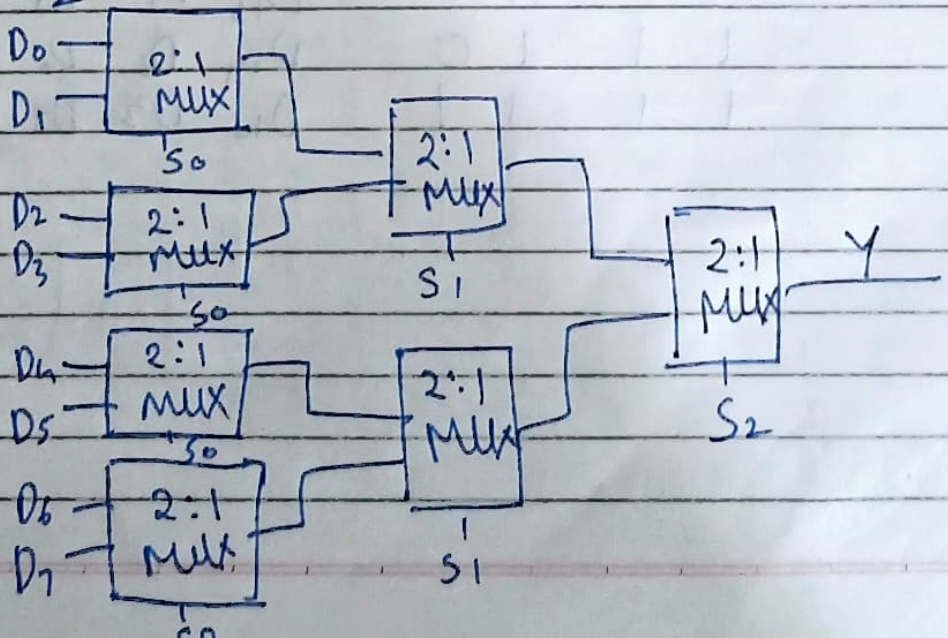


2) Implement 8:1 MUX using 2:1 MUX.

$$n = \frac{8}{2} = 4$$
$$+$$
$$\frac{4}{2} = 2$$
$$+$$
$$\frac{2}{2} = 1$$

} 7 (2:1) MUX

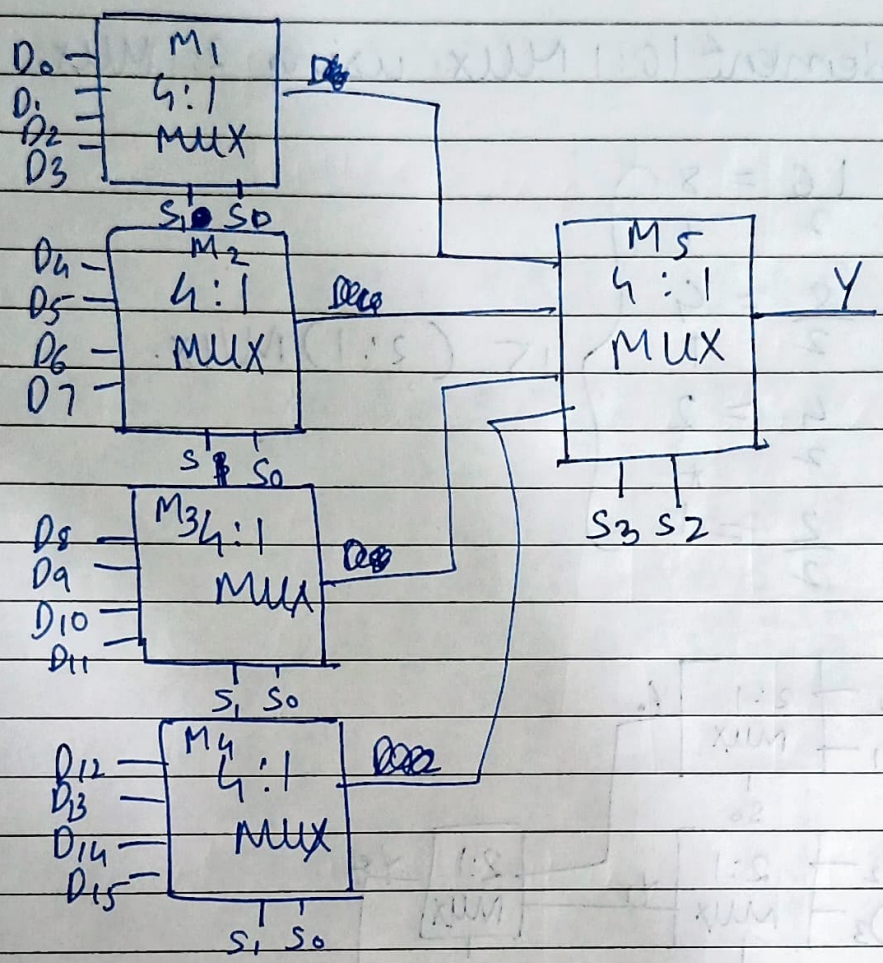
S_2 S_1 S_0 Y



3) Implement 16:1 MUX using 4:1 MUX.

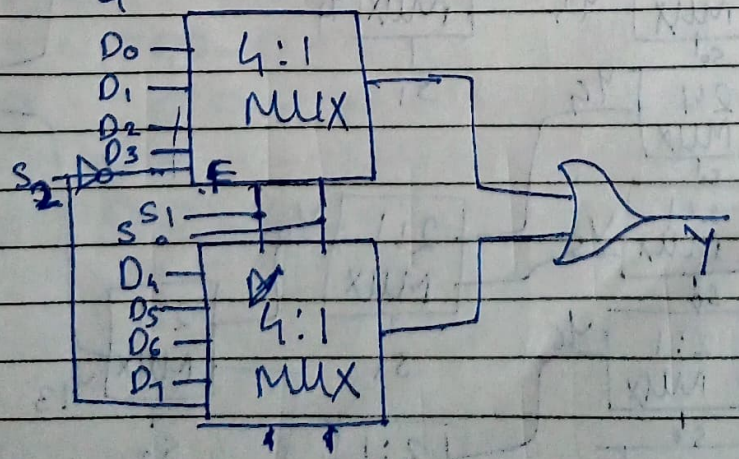
$n = \frac{16}{4} = 4$
$\frac{4}{4} = 1$
$\left.\begin{matrix} \\ \\ \end{matrix}\right\}$ 5 (4:1) MUX are required.

S_3	S_2	S_1	S_0	Y	M_1	M_2	M_3	M_4	M_5
0	0	0	0	D_0	D_0	D_4	D_8	D_{12}	
0	0	0	1	D_1	D_1	D_5	D_9	D_{13}	
0	0	1	0	D_2	D_2	D_6	D_{10}	D_{14}	
0	0	1	1	D_3	D_3	D_7	D_{11}	D_{15}	
0	1	0	0	D_4	D_4	D_8	D_{12}		
0	1	0	1	D_5	D_1	D_5	D_9	D_{13}	
0	1	1	0	D_6	D_2	D_6	D_{10}	D_{14}	
0	1	1	1	D_7	D_3	D_7	D_{11}	D_{15}	
1	0	0	0	D_8	D_0	D_8	D_{12}		
1	0	0	1	D_9	D_1	D_5	D_9	D_{13}	
1	0	1	0	D_{10}	D_2	D_6	D_{10}	D_{14}	
1	0	1	1	D_{11}	D_3	D_7	D_{11}	D_{15}	
1	1	0	0	D_{12}	D_4	D_8	D_{12}		
1	1	0	1	D_{13}	D_1	D_5	D_9	D_{13}	
1	1	1	0	D_{14}	D_2	D_6	D_{10}	D_{14}	
1	1	1	1	D_{15}	D_3	D_7	D_{11}	D_{15}	



4) Implement 8:1 MUX using 4:1 MUX.

$n = \frac{8}{4} = 2$ (4:1) MUX are required.



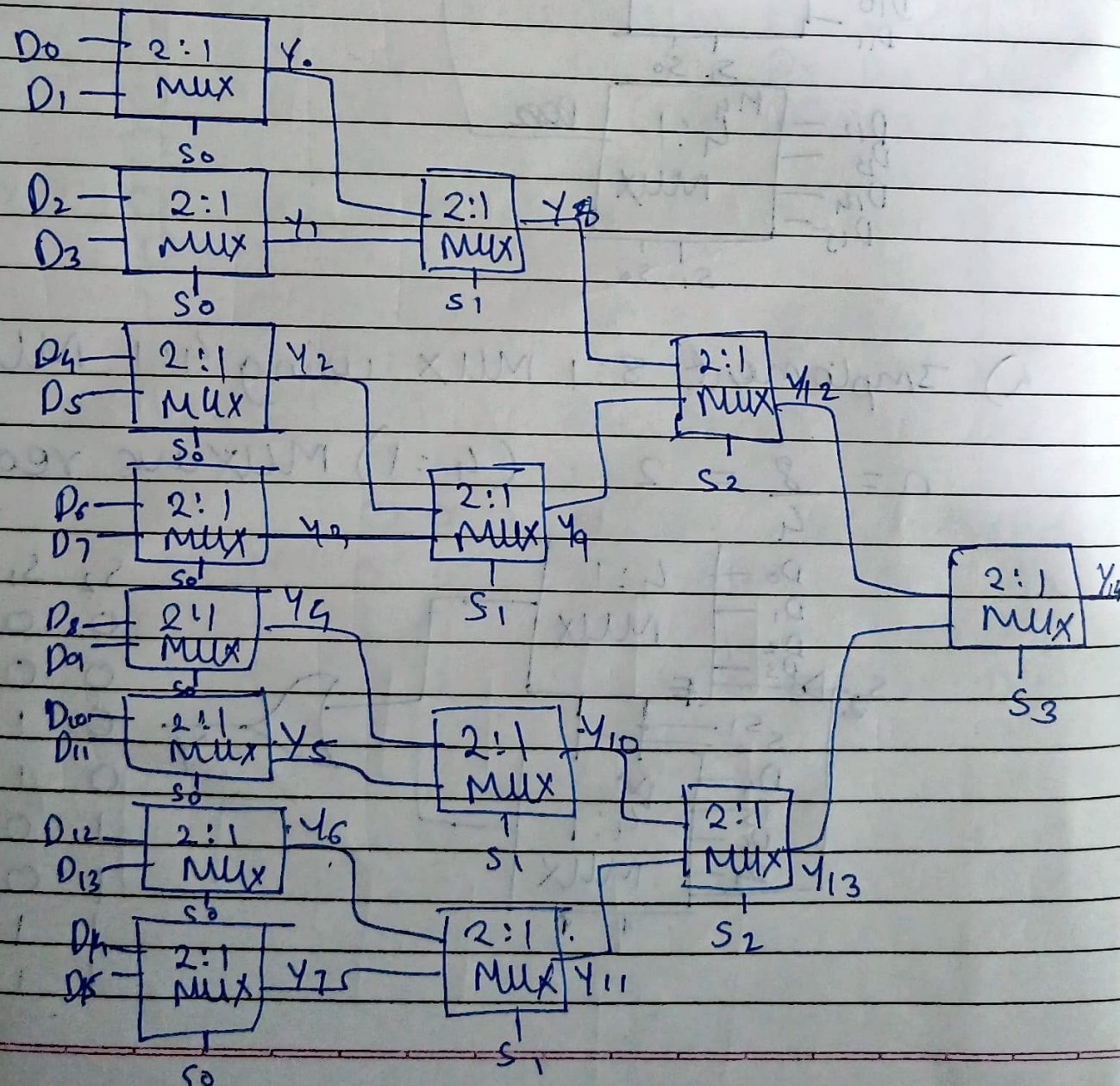
S_2	S_1	S_0	Y
0	0	0	D_0
0	0	1	D_1
0	1	0	D_2
0	1	1	D_3
1	0	0	D_4
1	0	1	D_5
1	1	0	D_6
1	1	1	D_7

PAGE No.
DATE / /

Q5) Implement 16:1 MUX using 2:1 MUX

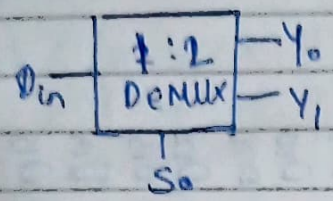
$\frac{16}{2} = 8$ +
$\frac{8}{2} = 4$ +
$\frac{4}{2} = 2$ +
$\frac{2}{2} = 1$

15 (2:1) MUX.



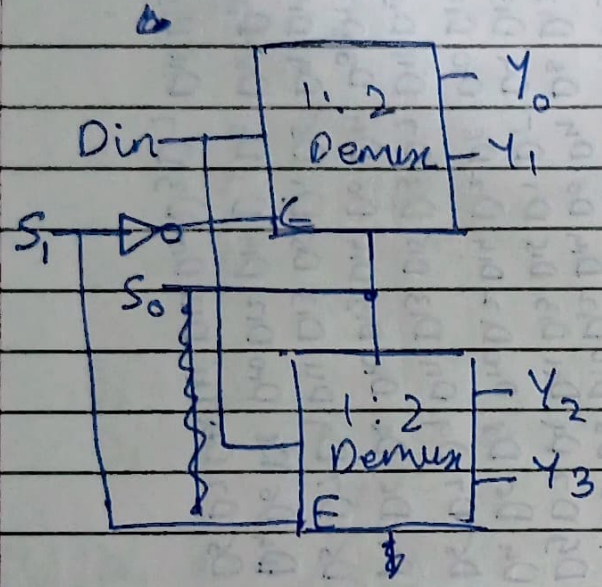
29/11

DeMUX



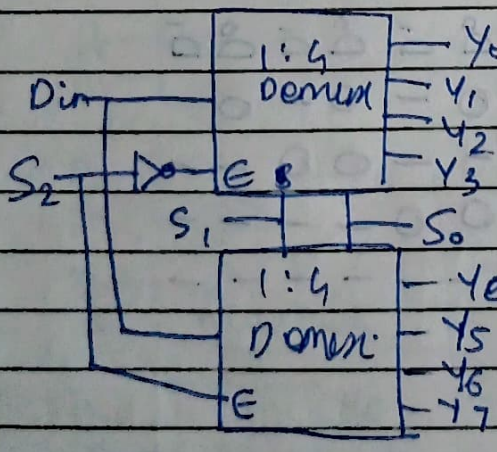
S_0	Y_0	Y_1
0	Din	0
1	0	Din

Q1) Construct 1:4 demux using 1:2 Demux.



S_1	S_0	Y_0	Y_1	Y_2	Y_3
0	0	Din	0	0	0
0	1	0	Din	0	0
1	0	0	0	Din	0
1	1	0	0	0	Din

Q2) Construct 1:8 demux using 1:4 Demux.

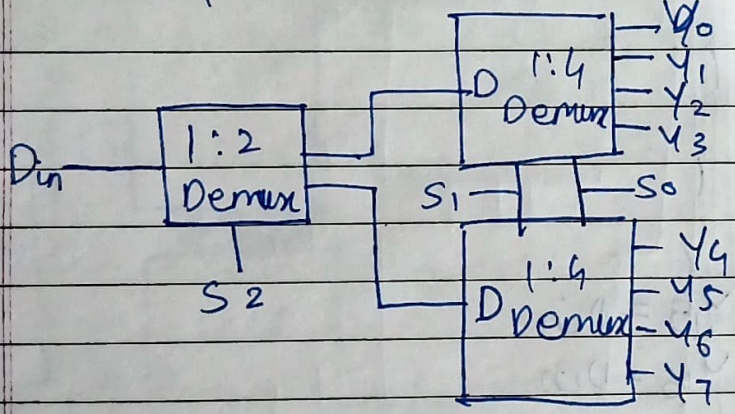


S_2	S_1	S_0	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7
0	0	0	Din	0	0	0	0	0	0	0
0	0	1	0	Din	0	0	0	0	0	0
0	1	0	0	0	Din	0	0	0	0	0
0	1	1	0	0	0	Din	0	0	0	0
1	0	0	0	0	0	0	Din	0	0	0
1	0	1	0	0	0	0	0	Din	0	0
1	1	0	0	0	0	0	0	0	Din	0
1	1	1	0	0	0	0	0	0	0	Din

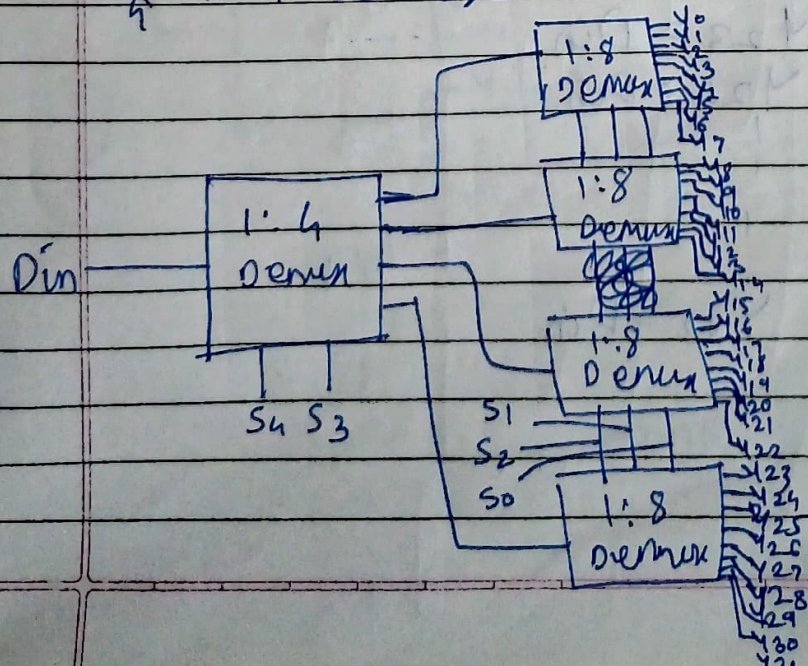
PAGE NO.
DATE / /

Q3) Implement 1:8 Demux using 1:2 Demux & 1:4 Demux.

S_2	S_1	S_0	Y_0	Y_1	Y_2	Y_3	Y_4	Y_6	Y_7
0	0	0	Din	0	0				
0	0	1	0	Din	0				
0	1	0	0	0	Din				
0	1	1	0	0	0				
1	0	0	0	0	0				
1	0	1	0	0	0				
1	1	0	0	0	0				
1	1	1	0	0	0				



4) Implement 1:32 Demux using 1:8 demux. & 1:4 demux.



S_4	S_3	S_2	S_1	S_0	Y
0	0	0	0	0	$Y_0 = D_{in}$
0	0	0	0	1	
0	0	0	1	0	
0	0	0	1	1	
0	0	1	0	0	
0	0	1	0	1	
0	0	1	1	0	
0	0	1	1	1	Y_7 D_{in}
0	1	0	0	0	$Y_8 = D_{in}$
0	1				
0	1				
0	1				
0					
0					
0					
0	1	1	1	1	$Y_{15} = D_{in}$
1	0				$Y_{16} = D_{in}$
1					
1	1				
1	1				
1	1				
1	0				$Y_{23} = D_{in}$
1	1				$Y_{24} = D_{in}$
1	1				
1	1				
1	1				
1	1				$Y_{32} = D_{in}$

$\frac{64}{8} = 8$ ×
$\frac{8}{8} = 1$

$2^5 = 64$

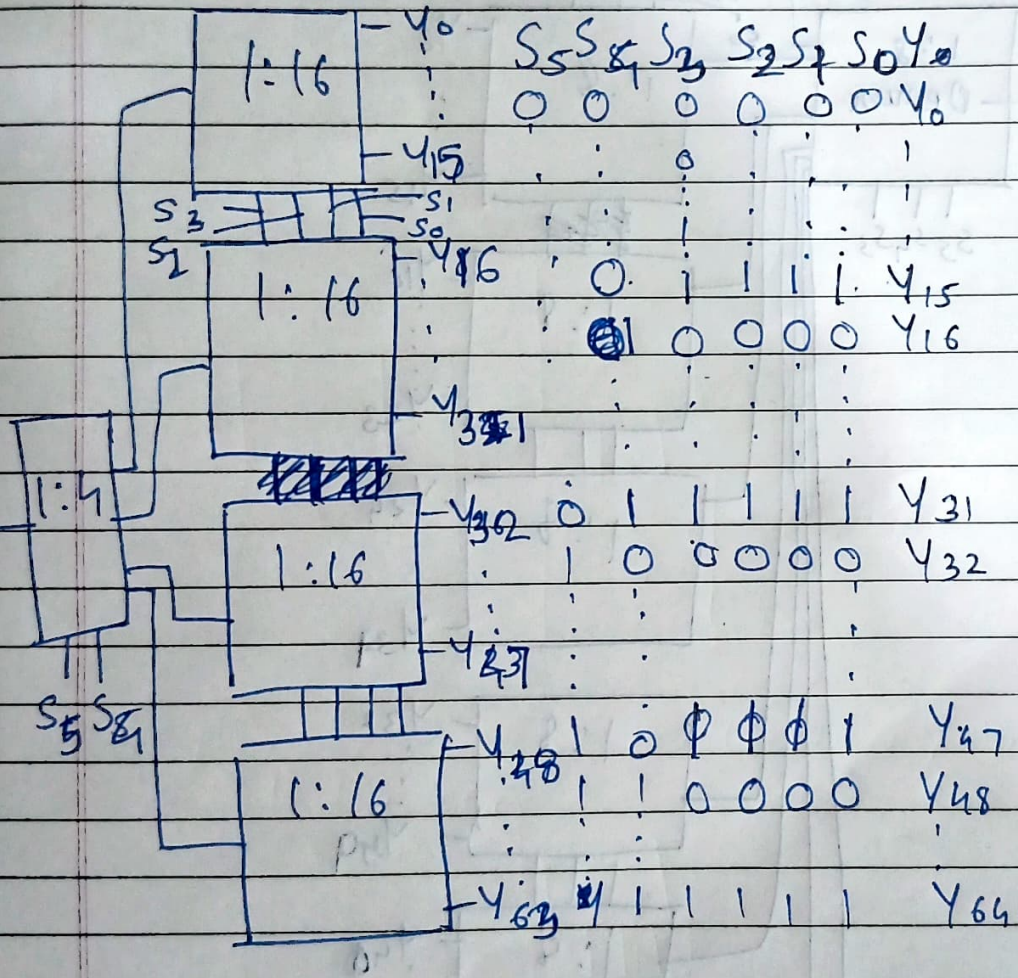
PAGE NO.
DATE / /

5) Implement 1:64 demux using 1:16 demux

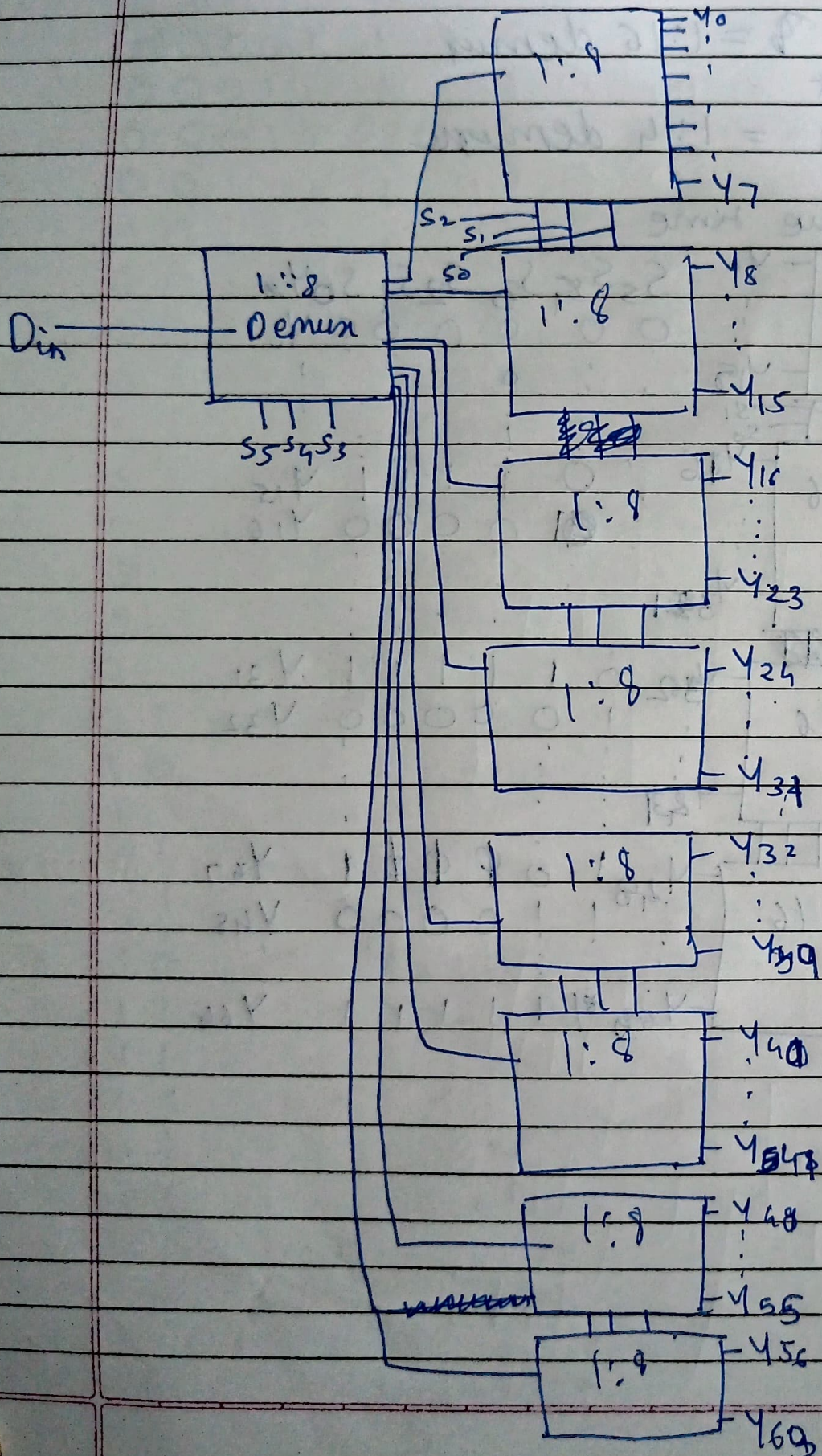
$\frac{64}{16} = 4$ = 1:16 demux

$\frac{4}{4} = 1$ = 1:4 demux

Just to save time



Q6) 1:64 using 1:8 demux. (Just to save time)



PAGE No.
DATE / /

H.W

8) 1:16 using 1:8 & 1:2 demux
8) Full subtractor using 1:8 demux.
9) Implement full adder using 1:8 demux.
9) Implement 1:16 demux using 1:4 demux.
8) Implement 2 bit comparator using 1:16 demux
9) Design A combinational circuit for BCD to gray code using (i) 8:1 MUX (ii) 4:1 MUX.