Combinational Circuits

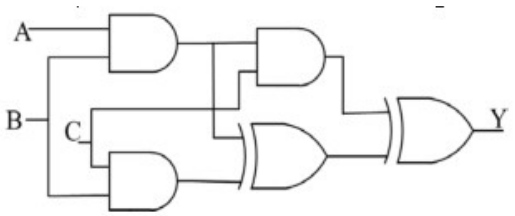
Duration: 2 hours **Section-1 (5M)**

1. Design OR and XOR gate using NAND and NOR gates

2. Convert the following SOP expression to an equivalent POS expression.

$$A\,B\,C + A\,\overline{B}\,\overline{C} + A\,\overline{B}\,C + A\,B\,\overline{C} + \overline{A}\,\overline{B}\,C$$

3. The output of the combinational circuit given below is

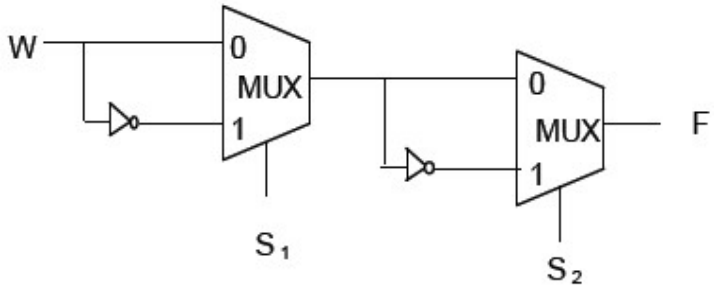


4. From the truth table below, determine the standard SOP expression.

Inputs			Output
A	B	C	X
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

5. Prove that (A+B'+AB)(A+B')(A')=0

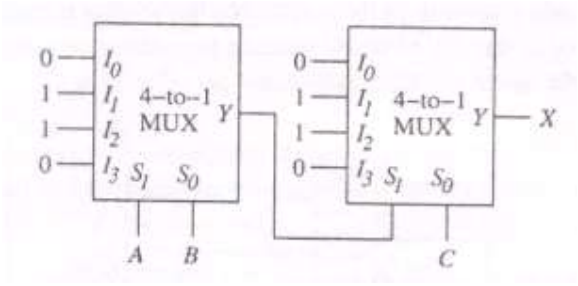
6. Consider the multiplexer based logic circuit shown in the figure.



What is the Boolean function is realized by the circuit

7. Design the 3-bit input circuit which identifies 3 multiples?

8. In the following circuit, *X* is given by



9. Perform Hex addition

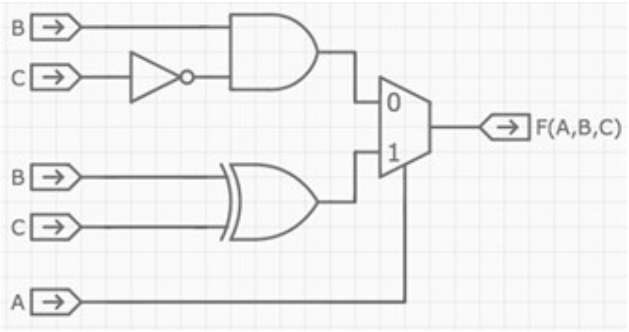
1. 39a+4fd
2. adf+bec

Section-2 (10M)

10. Construct a 5-to-32-line decoder using four 3-8-line decoders with enable inputs and a 2-to-4-line decoder.

11. Design and implement 4:16 decoder using 2:4 decoders only

12. A intern at Intel has designed the combinational circuit shown.



A	*B*	*C*	*F(A,B,C)*
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Please fill in the truth table for F(A,B,C).

13. Design a circuit for 5-bit Fibonacci series.