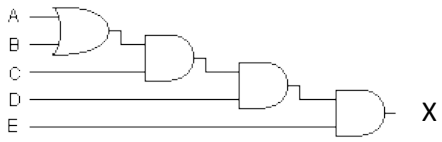
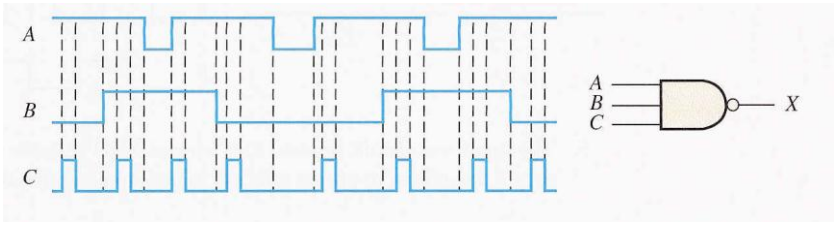
a. Derive the Boolean expression 'X' for the logic circuit shown below:



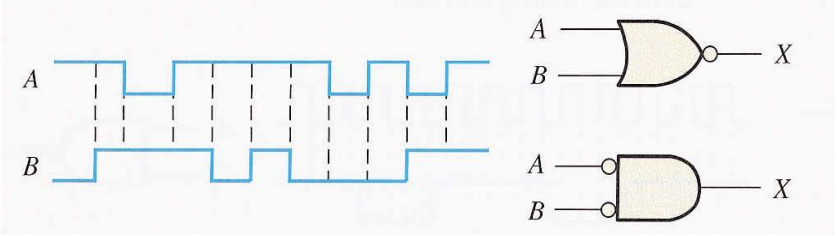
b. From the truth table below, determine the standard POS expression.

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

c. Determine the gate output for the input waveform in the figure below and draw the timing diagram.



d. The NAND and the negative-OR symbols represent equivalent operations, but they are functionally different. For the NOR symbol, look for at least one HIGH on the inputs to give a LOW on the output. For the negative-AND, look for two LOW's on the inputs to give a HIGH output. Using these two functional points of views, show that both gates in the figure below will produce the same output for the given inputs.



Question-3

a. Using Boolean algebra techniques, simplify this expression: ***AB + A (B + C) + B (B + C)***

b. Convert the following Boolean expression to SOP form: $\overline{(A + B)} + C$

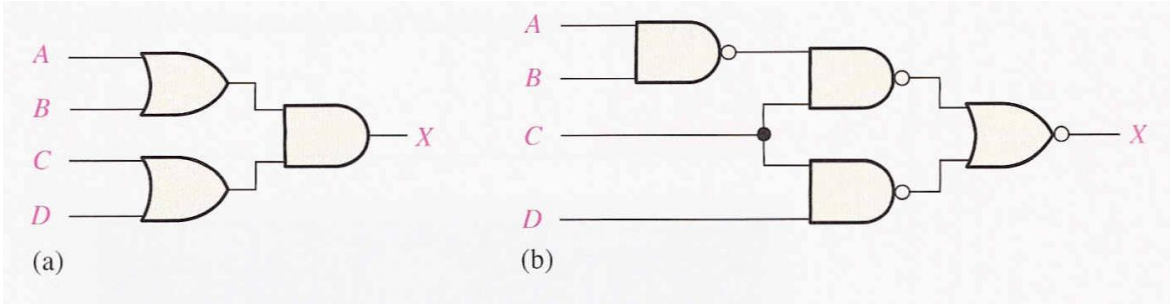
c. Convert the following Boolean expression into standard POS form: $(A + \overline{B} + C)(\overline{B} + C + \overline{D})(A + \overline{B} + \overline{C} + D)$

d. Reduce the function specified in truth table given below to its minimum SOP form By Karnaugh map and draw its circuit.

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

Question-4

Write the output expression for each circuit given below. Then Change each circuit to an equivalent AND-OR configuration. Finally develop a truth table for each of the circuit.



END OF TEST