Analysis and Synthesis of Boolean Expressions using Basic Logic Gates

INTRODUCTION (#) THEORY (#) OBJECTIVE (#) PROCEDURE (#) SIMULATOR (#) QUIZZES (#) REFERENCE (#)

Theory

Analysis of Logic gates using 7400(quad 2-input NAND gates),7402(quad 2-input NOR gates), 7404(HEX inverter),7408(quad 2-input AND gates),7432(quad 2-input OR gates). Diagrams of each chip are shown in Figure

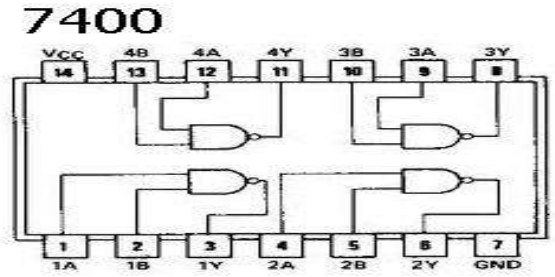


Figure 1

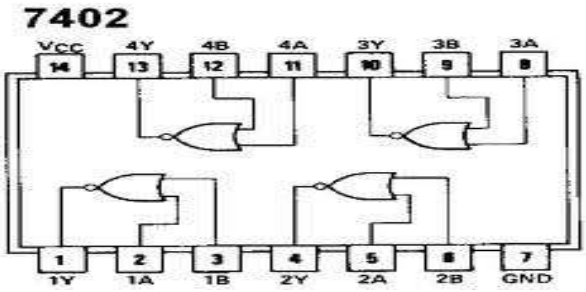


Figure 2

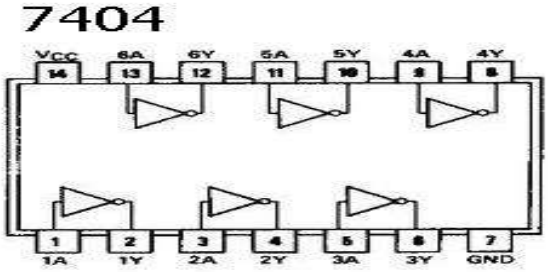


Figure 3

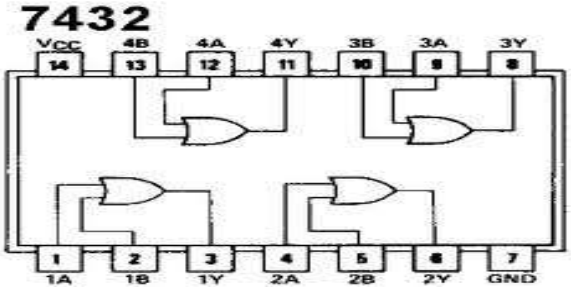
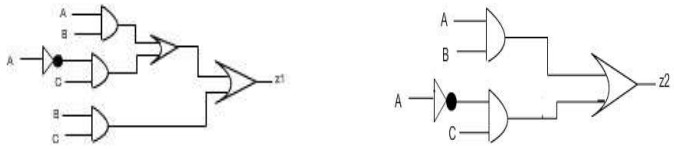


Figure 4

Fig: 1 . 7400(quad 2 input NAND gates) Fig: 2 . 7402 (quad 2 input NOR gates)
Fig: 3 . 7404(HEX inverter) Fig: 4 . 7432(quad 2-input OR gates)

(a)$AB+\overline{A}C+BC=AB+\overline{A}C$

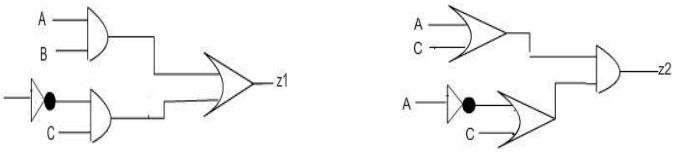
According to consensus theorem,the Boolean identity holds.



In the above picture both circuits are equivalent.

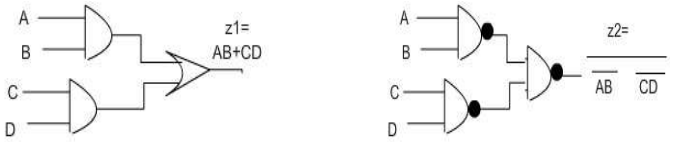
(b)$AB+\overline{A}C=(A+C)(\overline{A}+B)$

According to consensus theorem,the Boolean identity holds.



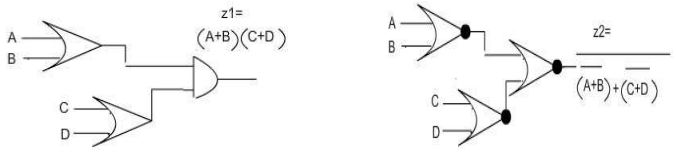
In the above picture both circuits are equivalent.

(c)Verify eqivalence of AND-OR and NAND-NAND structure



In the above picture both circuits are equivalent.

(d)Verify eqivalence of OR-AND and NOR-NOR structure



In the above picture both circuits are equivalent.

Student may be asked to wire up the network of gates shown in the above figures. They can next verify that the output of the two circuits,viz z1 and z2 should attain the same value for each of the eight possible input combinations assigned to the variables A,B,C,and D.