Table 6.1 Product Terms from a Truth Table

A	B	C	Y	
0	0	0	1	$\bar{A}\,\bar{B}\,\bar{C}$
0	0	1	0	
0	1	0	0	
0	1	1	1	$\bar{A}\,B\,C$
1	0	0	0	
1	0	1	0	
1	1	0	1	$A\,B\,\bar{C}$
1	1	1	0	

Figure 6.1 shows the logic diagram derived from this Boolean expression. The circuit can be implemented by a combination of AND, OR, and NOT gates.

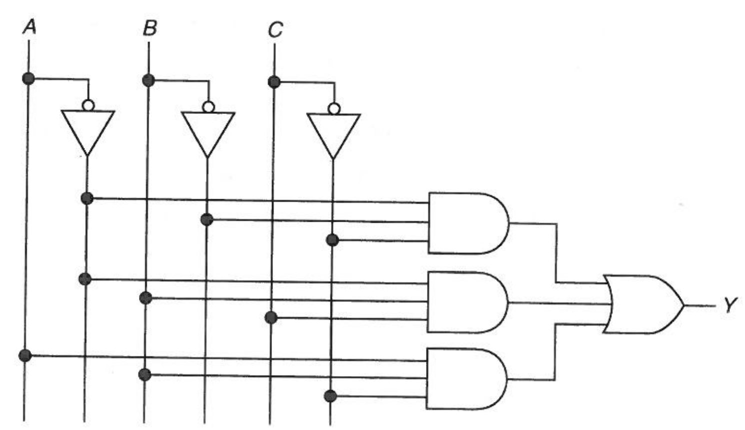

Figure 6.1 Sum-of-Products Network (AND-OR Construction)

An alternative configuration, shown in Figure 6.2, can be constructed using only NAND gates and inverters. The output gate is a NAND gate, shown in its DeMorgan equivalent form. The circuit can be derived from an AND-OR configuration by inverting all AND outputs and all OR inputs, as shown. In some cases, this can result in a more efficient circuit implementation (i.e., with fewer logic gate packages) than the AND-OR circuit. In this case, both circuits are equally efficient to build.

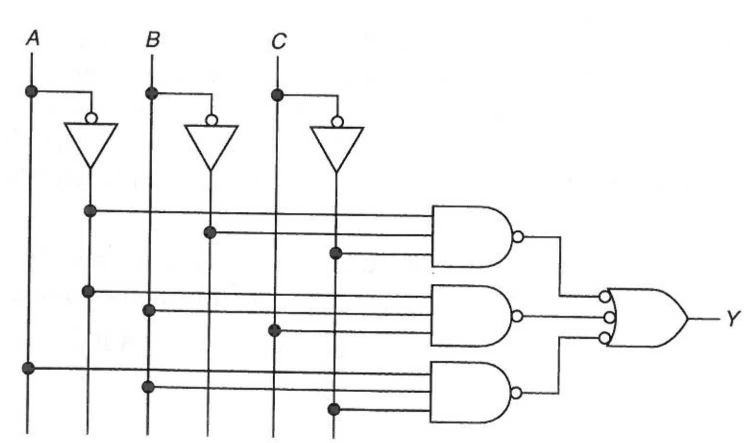

Figure 6.2 Sum-of-Products Network (NAND-NAND Construction)

Procedure

1. Draw the unsimplified logic diagram represented by the following Boolean expression:

$$Y = (\overline{AD + B\bar{D}})\,C$$

2. Connect the circuit drawn in Step 1, using 74LS08 or 74HC08 AND gates, 74LS02 or 74HC02 NOR gates, and 74LS04 or 74HC04 inverters. Refer to Figure 6.3 at the end of this lab for the IC pinouts. Connect a logic switch to each input and an LED monitor to the output.

   Refer to previous labs for configuration of logic switches and LED monitors. If you are using a digital trainer, use the logic switches and LED monitor on the trainer.

3. Construct the truth table of the circuit in Step 2 by setting the input switches to all possible input combinations and noting the output value for each combination. Write the truth table in the space provided below.