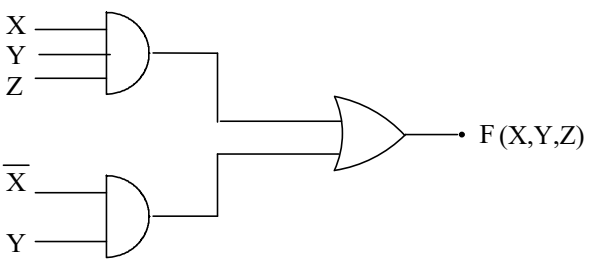
Homework Questions

Circuits and Electronics

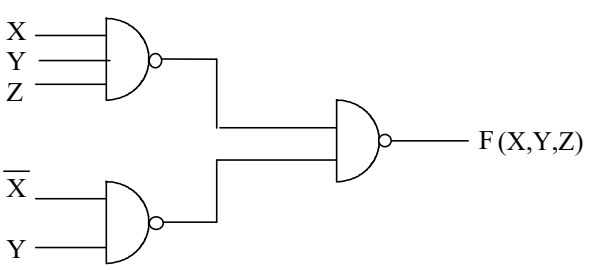
Week 1

Q.1 Determine the truth table for the following logic circuits

(a)



(b)



(c) What can you say about the above two circuits?

Q.2 Consider the following Boolean function:

$$\overline{F} = \overline{B}D + \overline{A}B\overline{C} + ACD + \overline{A}BC$$

(a) Find the complement of the Boolean function and reduce it to seven literals in sum-of-products form.

(b) Using a truth table show that the reduced Boolean function for is equivalent to the original expression.

(c) Implement the simplified expression using AND, OR and NOT logic gates in a 2-level gate circuit.

Q.3 Use Karnaugh maps to obtain the simplified expressions in sum-of-products form for the following Boolean functions:

(a) $A\,B\,D + \overline{A}\,\overline{C}\,\overline{D} + \overline{A}\,B + \overline{A}\,C\,\overline{D} + A\,\overline{B}\,\overline{D}$

(b) $\overline{X}\,Z + \overline{W}\,X\,\overline{Y} + W\,(\overline{X}\,Y + X\,\overline{Y})$

Q.4 Using Karnaugh maps, simplify the following expressions, using sum-of-products form:

(a) $A\,B\,C + \overline{A}\,\overline{B}\,C + \overbrace{\overline{A}\,B\,C + A\,\overline{B}\,C + A\,B\,\overline{C}}^{\text{don't cares}}$

(b) $A\,B\,C\,D + \overline{A}\,\overline{B}\,C\,D + \overbrace{\overline{A}\,B\,C\,D + A\,\overline{B}\,C\,D + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D}}^{\text{don't cares}}$

(c) $A\,\overline{B}\,C\,\overline{D} + A\,\overline{B}\,C\,D + \overbrace{\overline{A}\,B\,\overline{C}\,D + \overline{A}\,B\,\overline{C}\,\overline{D}}^{\text{don't cares}}$