

Switching Theory - CS225

Assignment - 2

Deadline : 18-Feb-2020

Note:

1. Submit the answer(Handwritten) to question No. 1-6 is to TA (Mr. Srikanata Pradhan, Network Security Lab (R 511), CSE Dept.).
2. Send your Code with input, output in a file with "CS225-Ass2-xxxx, where, xxxx is your Roll.No. to som_assign@iitp.ac.in. Mention the sub as CS225-Ass2

1. The majority function $M(x, y, z)$ is equal to 1 when two or three of its arguments equal 1, that is $M(x, y, z) = xy + xz + yz = (x + y)(x + z)(y + z)$
 - (a) Show that $M(a, b, M(c, d, e)) = M(M(a, b, c), d, M(a, b, e))$
 - (b) Show that $M(x, y, z)$, the complementation operation, and the constant 0 form a functionally complete set of operations.
2. For the Boolean function $F = xy'z + x'y'z + w'xy + wx'y + wxy$
 - (a) Draw the logic diagram, using the original Boolean expression
 - (b) Use Boolean algebra to simplify the function to a minimum number of literals.
 - (c) Draw the logic diagram from the simplified expression
3. Prove that the logical sum of all minterms of a Boolean function of $n = 3$ variables is 1.
4. Prove that if $w'x + yz' = 0$, then $wx + y'(w' + z') = wx + xz + x'z' + w'y'z$
5. Determine the values of A, B, C, and D that make the sum term $A' + B + C' + D$ equal to zero.
6. Plot the following expression on a Karnaugh map

$$Z = (A \cdot B) \oplus (C + D)$$

7. Write a program to convert standard SOP(sum of products) form to standard POS(product of sums) form.
8. Write a program to simplify a 3-variable Boolean expression using k-map.