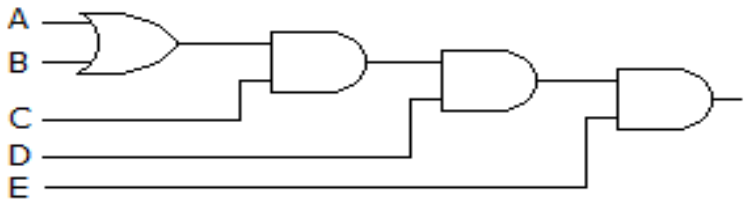
MEKDELA AMBA UNIVERSITY

DEPARTMENT OF COMPUTER SCIENCE

DIGITAL ELECTRONICS WORKSHEET

- Choose five questions as an assignment.
- Due date for assignment is date of your final exam
- Assignment weight: 25%

1. State and briefly explain advantages of digital circuits over analog circuits.
2. Convert the following binary numbers in decimal: **101110**; **1110101**; and **110110100.**
3. Convert the following decimal numbers to the bases indicated.
   a. 7562 to octal
   b. 1938 to hexadecimal
   c. 175 to binary
4. Simplify the following expressions using Boolean algebra.
   a. AB + A(CD + CD')
   b. (BC' + A'D) (AB' + CD')
5. Determine the values of A, B, C, and D that make the sum term **A'+B+C'+D** equal to zero.
6. Derive the Boolean expression for logic circuit shown below



7. Draw the logic diagram for the following Boolean expression.

   A. $\mathbf{T_1=XY+XZ+YZ}$

   B. $\mathbf{T_2=Z'}$

8. Simplify the Boolean expression **Z = (A'+B)(A+B).**

9. Given the Boolean function F = xy'z + x'y'z + xyz

a. List the truth table

b. Draw the logic diagram of the original function using 2-input gates

c. Simplify the function using Boolean algebra

d. List the truth table of the simplified function

e. Draw the logic diagram of the simplified function (using 2-input gates)

f. Draw the logic diagram of the simplified function using only 2-input NAND gates

10. Discuss the difference between combinational and sequential digital circuits.

11. Discuss briefly the operations and applications of the following digital circuit building blocks.

a) Multiplexers

b) Decoders

c) Registers

d) Counters

12. Classify each of the following digital circuits as either a combinational circuit or a sequential circuit.

a. Multiplexers

b. Encoders

c. Shift-registers

13. Design a logic circuit that has three inputs and whose output is high whenever two or more of the three inputs are low.

I. Construct a 3-input truth table that meets the criteria given.

II. Use the Karnaugh Map technique to find the reduced sum-of-product (SOP) expression.

III. Draw the logic circuit for the reduced SOP expression.