# Digital Logic (CSC 116) Practical Report Manual:

**1) Report should be written in A4 size paper**

**2) Question / Title:**

**3) Objectives:** After completing this practical:

   **i)** We will be able to identify and explain the function of the logic gates.

  ii) Draw the symbols for the basic logic gates.

  **iii)** Develop truth tables for the basic logic gates

**4) Requirements:**

  i)  Digital Logic Kit and Simulator

  ii) Logic gates/Logic Circuit

  iii) Connecting wires

  iv) Interactive/ Sequence generator as input

  v)  LED as Output

**5) Theory**

  **i)**  Introduction

  **ii)**  Functional Expression/Logic Expression

  **iii)**  Circuit Diagram

  **iv)**  Truth Table

**6. Conclusion**

**Practical.1. Realize three input AND, OR, NAND and NOR gates with logic diagram and truth table.**

**i)  AND Gate:**

**Objectives:** After completing this practical:

  a.  We will be able to identify and explain the function of 3-input AND gate.

  b. Draw the symbols for the AND gate.

  c. Develop truth tables for the 3-input AND gate.

**ii) OR Gate:**

**iii) NAND Gate:**

**iv) NOR Gate:**

**Practical.2 Realize the given Boolean functions with logic diagram and truth table**

i) $F1 = X'\ Y\ Z + X\ Y'\ Z + X'\ Y'\ Z' + X\ Y\ Z'$

ii) $F2 = (W' + X' + Y)'.\ Z(X'+Y)'$

**Practical.3. Realize NAND and NOR as Universal Logic Gates.**

**Practical.4. State and prove De-Morgan's Theorem with logic diagram and truth table:**

i) $\overline{X + Y} = \overline{X}\ .\ \overline{Y}$

ii) $\overline{X.\ Y} = \overline{X} + \overline{Y}$

**Practical.5. Simplify the Boolean function F using don't care condition d, in SOP and POS. Implement simplified function with basic logic gates, NAND gates for minimal SOP and with basic logic gates, NOR gates for minimal POS.**

$$F = A'\ B'\ D' + A'\ C\ D + A'\ B\ C$$
$$d = A'\ B\ C'\ D + A\ C\ D + A\ B'\ D'$$

**Practical.6. Implement Full Adder logic circuit in both SOP and POS with logic diagram and truth table.**

**Practical.7. Design Seven segment display circuit to display the decimal numbers 1, 3 and 7.**
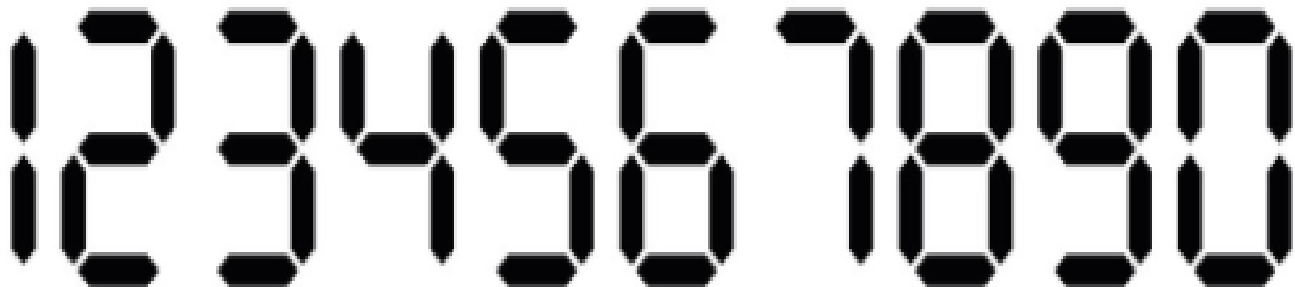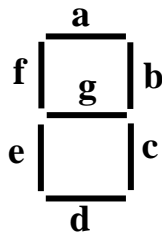




$a = 0, 2, 3, 5, 6, 7, 8, 9$

b= 0, 1, 2, 3, 4, 7, 8, 9

c= 0, 1, 3, 4, 5, 6, 7, 8, 9

d = 0, 2, 3, 5, 6, 8, 9

e = 0, 2, 6, 8

f = 0, 4, 5, 6, 8, 9

g = 2, 3, 4, 5, 6, 8, 9

k- map for a:

$a = W + Y + X'Z' + XZ$

$b = X' + YZ + Y'Z'$

$c = X + Y' + Z$

$d = W + YZ' + X'Y + XY'Z + X'Z'$

$e = YZ' + X'Z'$

$f = W + Y'Z' + XY' + XZ'$

$g = W + XY' + YZ' + X'Y$