

**Digital Logic (CSC-151)**  
**Tribhuvan University**  
**Soch College of Information Technology**  
**Bachelor of Science in Computer Science and Information Technology**

**Course Title:** Digital Logic

**Course no:** CSC-151 ----- Full Marks: 60+20+20

**Credit hours:** 3 ----- Pass Marks: 24+8+8

**Nature of course:** Theory (3 Hrs.) + Lab (3 Hrs.)

**Course Synopsis:** General concepts to be used in the design and analysis of digital systems and introduces the principles of digital computer organization and design.

**Goals:**

Introduce fundamental digital logics and switching networks. Exposure of Boolean algebra and its application for circuit analysis.

Introduction to multilevel gates networks, flip-flops, counters and logic devices.

**Course Contents:**

**Unit 1. Binary Systems ----- 7 Hrs.**

Digital Systems, Binary Numbers, Number base conversion, Octal and hexadecimal numbers, Binary Systems, Integrated Circuits

**Unit 2. Boolean algebra and Logic Gates ----- 6 Hrs.**

Basic definition of Boolean Algebra, Basic Theory of Boolean Algebra, Boolean Function, Logic operations, Logic Gates, IC Digital Logic Families

**Unit 3. Simplification of Boolean Functions ----- 6 Hrs.**

K-map, Two and three Variable Maps, Four variable Maps, Product of Sums, sum of product simplification, NAND and NOR implementation

**Unit 4. Combinational Logic ----- 6 Hrs.**

Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, NAND Circuits, NOR Circuits, Exclusive -OR Circuit

**Unit 5. Combinational Logic with MSI and LSI ----- 6 Hrs.**

Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, Read-Only- Memory (ROM), Programmable Logic array (PLA)

**Unit 6. Sequential Logic ----- 8 Hrs.**

Flip-flops, Triggering of flip-flops, Design procedure, Design with state equations and state reduction table.

**Unit 7. Registers and Counters ----- 6 Hrs.**

Resisters, Shift registers, Ripple Counters, Synchronous Counters, Timing Sequences, The Memory Unit

**Laboratory works:**

Familiarization with logic gates

Encodes and decodes

Multiplexer and de-multiplexer  
Design of simple combination circuits  
Design of adder/subtractor  
Design of Flip-Flop  
Clock driven sequential circuits  
Conversion of parallel data into serial format  
Generation of timing signal for sequential system

**Text Book:**

M. Morris Mao, "Logic & Computer Design Fundamentals", Pearson Education.