

Institute of Computer Science/Information Technology (ICS&IT)  
Faculty of Management Sciences & Computer Sciences (FMCS)  
The University of Agricultural Peshawar

Program: BS(CS)-II  
Course Name: Digital Logic Design  
Course Code : CC-312  
Course Hours : 03  
Total Weeks : 16  
Total Hours : 48

Course Objectives:

This course covers the topics, which provides the students the basic concept of switching theory and digital design. After studying this course the students will be able to understand the working principle and design of digital systems. It includes the following topics which prepare the students for the design of circuits used in micro computer: number system, computer codes, logic gates, Boolean algebra, combinational logic circuits, flip flops, registers, counters, memories, and microprocessor etc.

This course will help and prepare the students to take advance courses in computer architecture in future.

NUMBER SYSTEMS, OPERATIONS, AND CODES

Week-1

- Decimal Numbers
- Binary Numbers
- Binary to Decimal Conversion
- Binary Arithmetic
- 1's and 2's Compliments of Binary Numbers

Week-2

- Signed Numbers
- Arithmetic Operations with Signed Numbers
- Hexadecimal Numbers
- Octal Numbers
- Binary Coded Decimal (BCD)
- Digital Codes and Parity

Week-3

LOGIC GATES

- The Inverter (NOT Gate)
- The AND Gate
- The OR Gate
- The NAND Gate
- The NOR Gate
- The X-OR and X-NOR Gate

BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION

- Week-4
- Boolean Operations and Expressions
  - Laws and Rules of Boolean Algebra
  - De-Morgan's Theorems
- Week-5
- Boolean Analysis of Logic Circuits
  - Simplification using Boolean Algebra
- Week-6
- Standard Forms of Boolean Expressions
  - Boolean Expressions and Truth Tables
- Week-7
- The Karnaugh Map
  - Karnaugh Map SOP Minimizations
  - Karnaugh Map POS Minimizations
- Week-8
- COMBINATIONAL LOGIC
- Basic Combinational Logic Circuits
  - Implementing Combinational Logic
  - The Universal Property of NAND and NOR Gates
  - Combinational Logic Using NAND and NOR Gates
- FUNCTIONS OF COMBINATIONAL LOGIC
- Week-9
- Basic Adders
  - Parallel Binary Adders
  - Comparator
- Week-10
- Decoders
  - Encoders
- Week-11
- Multiplexer
  - Demultiplexer
- Week-12
- FLIP-FLOPS AND RELATED DEVICES
- Latches
  - Edge-Triggered Flip-Flops
  - Master-Slave Flip-Flops
- Week-13
- COUNTERS
- Asynchronous Counter Operation
  - Synchronous Counter Operation
- SHIFT REGISTERS

Week -14

- Basic Shift Register Functions
- Serial In/Serial Out Shift Register
- Serial In/parallel Out Shift Register

Week-15

- Parallel In/Serial Out Shift Register
- Parallel In/Parallel Out Shift Register

Week-16 MICROPROCESSOR AND MEMORY/STORAGE DEVICES

- Random Access Semiconductor Memories
- Magnetic and optical Storage devices
- Introduction to Microprocessor and Microcomputer

RECOMMENDED BOOK:

DIGITAL FUNDAMENTALS 7<sup>th</sup> Edition, Thomas L. Floyd  
Prentice-Hall International, Inc.

REFERENCE BOOKS:

1. DIGITAL COMPUTER ELECTRONICS by Malvino
2. COMPUTER LOGIC DESIGN by M. Morris Mano