Syllabi of Computer Science DSC Courses

Semester : I
Course Type : DSC
Course Code : CSCDSC101
Name of the Course : Digital Computer Fundamentals
Learning level : Foundation or Introductory Course
Credits : 3
Contact Hours : 45
Total Marks : 100
End Semester Marks : 70
Internal Marks : 30

Course Objectives:

1. Familiarize with the fundamental concepts, terminology, and building blocks of digital logic circuits.
2. Introduce learners to Boolean algebra, logic gates, truth tables, and logic expressions, enabling them to understand and manipulate digital signals and logic functions.
3. How to design and analyze combinational logic circuits using logic gates and Boolean algebra, including applications such as arithmetic circuits, multiplexers, and decoders.
4. Introduce learners to sequential logic circuits, including flip-flops, registers, counters, and state machines, enabling them to design and analyze circuits that store and process information over time.
5. Provide an overview of digital memory elements and storage devices, including registers, RAM, ROM, and non-volatile memory, emphasizing their role in data storage and retrieval.

UNIT I

Computer Definition, Characteristics of Computers, Evolution of Computers & its applications, Types of Computers, Basic Organization of a Digital Computer, Computer design, Computer Architecture, Hardware and Software, Central Processing Unit, Input devices, Output devices, Computer Memory & Storage.

UNIT II

Number System, Boolean Algebra and Logic gates, simplification of Boolean functions- Map Method, Two and Three- variable Maps, Product of sums, Simplification, NAND and NOR implementation of logic gates, Don’t Care Condition, The Tabulation Method, Determination of Prime-implicants.

UNIT III

Combinational Logic: Introduction, Design Procedures, Adders, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Exclusive-OR and Equivalence

Functions, Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, Read Only Memory (ROM), Programmable Logic Array (PLA).

UNIT IV

Sequential Logic Circuits, Introduction, Flip-Flops, Analysis of Clocked Sequential circuits, State reduction and Assignment, Flip Flop Excitation Table, Design Procedure, Design of Counters, Design with State Equations.

UNIT V

Registers, Counters, Memory Unit: Introduction, Registers, shift Registers, Ripple Counters, Synchronous Counters, Timing Sequences, The Memory Unit, Examples of Random Access Memories.

Course outcomes: *After successful completion of the course, the students will be able to:*

1. Demonstrate a solid understanding of the fundamental principles, terminology, and building blocks of digital logic circuits.
2. Develop skills in designing and analyzing combinational logic circuits using logic gates, Boolean algebra, and truth tables.
3. Acquire knowledge and skills in designing and analyzing sequential logic circuits using flip-flops, registers, counters, and state machines.
4. Demonstrate proficiency in implementing and optimizing digital logic circuits for performance, power consumption, and cost considerations.

Text Books:

1. M. Morris Mano, **Digital Design**, Third Edition, Prentice Hall India, 2009.
2. Donald P. Leach, Albert Paul Malvino&GoutamSaha, **Digital Principles and Applications**, Eighth Edition, Tata McGraw Hill, 2014.

Reference Books:

1. P. V. S. Rao, **Perspectives in Computer Architecture**, Prentice Hall India, 2004.
2. R. P. Jain, **Modern Digital Electronics**, Fourth Edition, McGraw Hill Education, 2009.
3. Thomas C. Bartee, **Digital Computer Fundamental**, Sixth Edition, McGraw Hill Education.