MANIPAL UNIVERSITY JAIPUR

School of Electrical, Electronics & Communication Engineering (SEEC)

Department of Electronics & Communication Engineering
Course Hand-out

Digital System Design and HDL | EC 1403 | 4 Credits

Session: July 14 – Dec. 14 | Faculty: Ms. Deepika Bansal | Class: Core Course

Course Outcomes: At the end of the course, students will be able to

[1403.1].   To impart the core knowledge of Digital Circuits and Systems-Hardware Development Language.
[1403.2].   To introduce the basic VHDL concepts.
[1403.3].   To understand the top-down design methodology, need for HDL and choose level of abstractions for modelling the system.
[1403.4].   To learn how the system's structure is described and explained.
[1403.5].   To know how the design of the system can be simulated before being manufactured to make them employable in industry.

A.   SYLLABUS

Basic structure and operation of Computers: Introduction to the basic operational concepts of digital computer. Von-Neumann and Harvard Architecture; Overview of typical computer architecture: Accumulator based, General Register based and Stack based.
Instruction Set: Instruction formats, types and addressing modes. Reverse Polish notation. Opcode Encoding techniques, Stack Addressing, RISC and CISC architecture.

Data Path and Control Unit Design: Basic concepts, Data path: Fast adders, subtractors, Types of Bus structures. Control Unit design methods-Hardwired and micro programmed.

Computer Arithmetic: Multiplication of signed and unsigned integers, Booths multiplication Algorithm, Division, Floating Point Arithmetic Operation.
Memory Organization: Memory hierarchies: types of ROMs, Main memory: SRAM and DRAM, Memory Address Map; Cache memory: mapping functions – associative, direct and set-associative.
Input/Output Organization: Introduction to Input/output Organization: Types of I/O: Isolated I/O, memory mapped I/O, programmed I/O, Interrupt driven I/O; Introduction to Direct Memory Access (DMA) & DMA Controller, DMA transfer methods; Introduction to Arbiters and Bus Arbitration methods;
Introduction to Multicore and Multi-processor Systems: Parallel Processing, Pipelining Structure of General-purpose Multiprocessor, Interconnection networks, Memory organization in Multiprocessors, Cache Coherence, Multicore organization: hardware and software performance issues.

B.   TEXT BOOKS

- Bhasker, J. A VHDL Primer, 3rd ed. Pearson   Education, 2003.
- M. J. S. Smith, *Application Specific ICs*, Pearson 1997.
- Brown, Stephen and Vranesic, Zvonko. Fundamentals of Digital Logic with VHDL   Design, 2nd ed. Tata McGraw-Hill, 2005.
- Roth CH, Digital System Design using VHDL, PWS, 1998
- Perry, Douglas. : VHDL Programming by Examples, 4th ed. Tata McGraw-Hill, 2002.