DSD

Digital System Design
Reference books

• “A VHDL Primer” by J. Bhasker
• “Digital System Design using VHDL” by Charles H. Roth
• “Digital System Design” by Neelu chaudhary or Yogesh Mishra
Section-A

• Introduction to Computer-aided design tools for digital systems.
• Hardware description languages
• Introduction to VHDL data objects, classes and data types, Operators, Overloading, logical operators.
• Types of delays
• Entity and Architecture declaration.
• Introduction to behavioral dataflow and structural models.
Introduction to Computer-aided design tools for digital systems

• The design methods which make the use of computer are known as Computer Aided Design methods.
• CAD tools refer to software tools that aid the development of circuits, systems and other things.
• Different CAD Tools for digital systems are:
  – Schematic entry tools
  – HDLS
  – HDL compilers, simulators and synthesis tools
  – Simulators
  – Test benches
  – Timing Analyzers and verifiers.
Applications of CAD Tools:

• For design and simulation of capacitive micro-accelerometer.
• In micro and macro systems
• In typical filter design cycle
• Designing of MEMS Devices
FLOW OF DIGITAL DESIGN PROCESS

1. REQUIRED DIGITAL SYSTEM
2. DEFINE SPECIFICATIONS
3. INITIAL DESIGN
4. INITIAL SYNTHESIS
5. FUNCTIONAL SIMULATION
6. DESIGN CORRECT?
   - NO → REDESIGN

VHDL

_V H S I C_ → Very High Speed Integrated Circuit

_Hardware_

_Description_

_Language_

• It is a language used to describe digital circuits.
• It is similar to computer programming except HDL is used to describe hardware rather than a program to be executed.
VHDL

- It is a hardware description language that can be used to model a digital system.
- The VHDL language can be regarded as an integration of the following languages:
  sequential language +
  concurrent language +
  net-list language +
  Timing specifications +
  waveform generation language => VHDL
VHDL’s History

• In 1981: Department of Defense of USA was involved with various vendors to purchase VHSIC chips and all those vendors were using different HDL to describe their product.

• Due to this DoD was facing problem of testing and verification. At that time the need of a standard HDL which is capable of design, documentation and verification of digital system was generated.
VHDL’s History (cont.)

• In 1983: DoD gave contract to IBM, Texas Instruments and Intermetrics to develop a language which can describe a hardware.

• In 1985: Version 7.2 VHDL was developed and released for public. In 1986, to standardize the language it had been handed over to IEEE.

• In 1987: Standard Version of VHDL “IEEE Std 1076-1987” was launched for industrial use.

• In 1993: language was upgraded with new features and upgraded version “IEEE Std 1076-1993” was launched.