(076-E&E-02-02) ELECTRONICS ENGINEERING (VLSI DESIGN AND TECHNOLOGY)

Significance of the Program

In the present trend of IC technology, there has been an increased demand for skilled Very-Large-Scale Integration (VLSI) engineers at IC design companies. This is due to the huge revolutionary developments in AI, EV, and smartphone technologies, all of which depend on smart ICs. Chip design and manufacturing are collectively called VLSI design. The current technology in use is sub 10 nanometers. This allows designers to integrate billions of transistors on a single IC that can be made very compact and rich in features. Almost all electronic devices have chips with multi-million transistors in them like Mobile phones, televisions, medical electronic and monitoring devices, Amplifiers, Sensors, Phase-Locked Loops, Processors, etc. are all VLSI designs. VLSI ICs can be classified as ASIC (Application Specific Integrated Circuit), Field-programmable Gate arrays (FPGA) and custom Analog IC's.

Career Options

There are many job openings as ASIC engineers, FPGA designer engineers and Analog designers.

- Design Engineer: The role of Design engineers is designing and developing integrated circuits (ICs) for a wide variety of applications. They use computer-aided design (CAD) tools to design schematics and layouts for ICs.
- Verification Engineer: Verification engineers in VLSI ensures the ICs design that meets the necessary specifications and function correctly. They use simulation and other testing tools to verify the functionality of the ICs and also involve in debugging in case of any issues arises.
- Physical Design Engineer: Physical design engineers use CAD tools to create detailed layouts of the ICs considering factors like manufacturing tolerances and performance requirements. They also involve in the optimization of the IC layout for improved performance or power consumption.
- Test Engineer: Test engineers in VLSI are responsible for developing and implementing test strategies and plans for ensuring the quality and reliability of ICs. They use specialized equipment and software to test the ICs and involve in the development of new testing methods for advanced IC technologies.

- Product Validation Engineer: The job of Product engineers in VLSI is to validate entire lifecycle of an IC product, from development to manufacturing to end-of-life. They work closely with the design and manufacturing teams to ensure the IC product meets the necessary specifications and produce efficiently.
- Software Engineer: Software engineers apply engineering principles and knowledge of programming languages to build software solutions for end users. Software engineers design and develop computer games, business applications, operating systems and network control systems.

Program Objectives

1. To study Hardware Description Language (HDL) based design approach.
2. To acquire knowledge in digital CMOS logic design.
3. To nurture students with CMOS analog circuit designs.
4. To realize importance of testability in logic circuit design.
5. To overview SoC issues and understand PLD architectures with advanced feature

Outcomes of the Program

On successful completion of the program, Graduates will be

1. Graduates will be able to apply the knowledge of computing, mathematics, science and electronic engineering for designing VLSI circuits.
2. Graduates will have an ability to design and conduct experiments, perform analysis and interpret the problems of VLSI design and embedded systems.
3. Graduates will have the skills to use modern engineering tools, software's and equipment's to analyze complex problems for research activities.
4. Graduate will show the understanding of the impact of engineering solutions on the society and also will be aware of contemporary issues.
5. Graduate will develop confidence in self-education and ability for lifelong learning.
6. Adaptability to change in work environment, good interpersonal skills and professional ethics.

Major Course Outline

1. Devices and Circuits
2. Digital System Design
3. Principles of Communication

4. IC Design, testing and verification
5. Software orientation.