System on Chip (404212)

Teaching Scheme:
Lectures: 3 Hrs/ Week

Examination Scheme:
In Semester Assessment:
Phase I : 30
End Semester Examination:
Phase II: 70

Course Objectives:
- The student will study SOC modeling and interfacing.
- The student will learn SOC system design.
- SOC design, SOC prototyping, verification, testing and physical design.
- The student will able to design , implement and test SOC.

Course Outcomes:
After successfully completing the course students will be able to
- Design the SOC prototype for real life applications.
- Analyze the various SOC design issues like clock domain crossing, power and timing analysis.

Unit I : **Introduction to SOC**   6L

Design of system on chip, Microsystems technology and applications, core architecture for digital media and the associated compilation techniques.

Unit II : **RTL Simulation**   6L

RTL Designs, RTL based chip design flow, design challenges, Simulation race, simulation-synthesis mismatch.

Unit III : **Timing Analysis and Clock Domain Crossing**   6L

Timing parameters for digital logic, factors affecting delay and slew, sequential arcs, clock domain crossing, bus synchronization, preventing data loss through FIFO.

Unit IV : **Power Issues**   6L

Introduction, History, Concepts of MEMS: Principles, application and design, Scaling Properties/Issues, Micromachining Processes: Substrates, lithography, wet/dry etching processes, deposition processes, film stress, exotic processes.

Unit V :   **Overview of Physical Design Automation**   6L

Physical design automation, behavioral synthesis, synthesis of FPGAs and testable ASICs micromachining processes: substrates, lithography, wet/dry etching processes, deposition processes, film stress, exotic process

Unit VI :   **SOC Testing and Packaging**   6L

Hardware/software co-design, test and design of circuit to integrated systems, SOC prototyping, verification, testing and physical design.
Micro System Packaging: Over view of mechanical packaging of micro electronics micro system packaging.

Text Books

1. Sanjay Churiwala, Sapan Garg , "Principles of VLSI RTL Design A Practical Guide", Springer
2. Youn-Long Steve Lin, "Essential Issues in SOC Design, Designing Complex Systems-on-Chip", Springer

Reference Books
1. Kamaran Eshraghian, "Principles of CMOS VLSI Design", Pearson Education
2. Rabey, Chandrakasan, "Digital IC Design", Preason Publication.