Course 33. Digital Systems Design (Video Course)

Faculty Coordinator(s):

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Detailed Syllabus:

1. **Introduction to Digital Design (4hr.)**
   - What is Digital?
   - Specification and Implementation of digital design
   - Structured and Trial-Error methods in design
   - Digital Computer Aided Design (CAD) tools

2. **Digital Logic (8hr.)**
   - Binary Number System
   - Octal, Hexa-decimal and BCD Codes
   - Number System Conversion
   - Use of different number systems in digital design
   - Logic gates – AND, OR, NOT, NAND, NOR etc.
   - NAND and NOR implementation of real life digital circuits
   - Digital Circuit Characterization – Fan-in/Fan-out, Switching functions, Switching times, Noise margin etc.

3. **Boolean Algebra (8hr.)**
   - AND, OR and other relations
   - DeMorgan’s law
   - Karnaugh Maps
   - Minimization of Sum of Products and Product of Sums
   - Design of minimal two-level gate networks
   - Design of multiple output two level gate networks

4. **Combinational Circuit Design (5hr.)**
   - Design Procedure
   - Design of Multiplexer, Decoder, Encoder, Comparator
   - Design of Seven-segment display, Parity generator
   - Design of large circuits using the above modules

5. **Synchronous Sequential Circuit Design (5hr.)**
   - Design of sequential modules – SR, D, T and J-K Flip-flops
   - Flip-flop applications – Clock generation, Counters, Registers
   - Basic State machine concepts

6. **Design of Programmable Logic (4hr.)**
   - Introduction to Programmable circuits
- Design of Read-Only Memory (ROM), Programmable Logic Arrays (PLA), Programmable Array Logic (PAL)

7. Digital Computing (6hr.)
   - Introduction to digital computer
   - Design of Arithmetic circuits – Adders, Multipliers
   - Design of Memory – ROM/RAM
   - Design of a simple CPU