**17EC2102 – SWITCHING THEORY & LOGIC DESIGN**

**(Common to EEE & ECE)**

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| **Course category:** | Program core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2 - 2 - 0 |
| **Pre-requisite:** | Number systems , Semiconductor device operations, basic arthematic operations | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  10 |

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| **Course Objectives** | Students undergoing this course are expected to understand: | |
| 1. To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions. 2. To introduce the methods for simplifying Boolean expressions. 3. To outline the formal procedures for the analysis and design of combinational circuits 4. To illustrate the concept of synchronous and asynchronous sequential circuits 5. To introduce the concept of various counters and Registers 6. To introduce the concept of memories and Memory expansion. | |
| **Course Outcomes** |  | Upon successful completion of the course , the students will able to: |
| CO1 | Understanding of the fundamental concepts and techniques used in digital electronics and understand and examine the structure of various number systems and its application in digital design |
| CO2 | Identify basic requirements for a design application and propose a cost effective solution |
| CO3 | Understand, analyse and design various combinational circuits |
| CO4 | Understand, analyse and design various sequential circuits. |
| CO5 | Identify and prevent various hazards and timing problems in a digital design. |
| CO6 | Understand the memories |
| **Course Content** | **UNIT – I**  **NUMBER SYSTEMS AND CODES:** Number systems, Signed binary numbers, Base conversions, Binary arithmetic, Complements, Binary codes–(BCD, Grey, ASCII).  **BOOLEAN ALGEBRA AND LOGIC GATES**: Basic definitions and theorems of Boolean algebra, De-Morgan’s theorem, Digital logic gates, Universal gates, Multi-level gate circuits. | |

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|  | **UNIT – II**  **MINIMIZATION OF DIGITAL CIRCUITS:** Standard forms of logical functions, Min-term and max-term specifications, Simplification by K-maps, incompletely specified functions, prime implicants, Essential prime implicants, Tabular method, Realization of logic functions using gates.  **UNIT -III**  **COMBINATIONAL LOGIC CIRCUITS:** Design procedure, Binary adder, Subtractor, Decimal adder, Magnitude comparator, Decoders, Encoders, Multiplexers, Demultiplexers.  **UNIT – IV**  **SEQUENTIAL CIRCUITS:** Sequential circuits, Storage Elements: (Latchs& Flip-flops), Master-slave Flip-flop, Flip-flop conversions, Timing and triggering consideration, Analysis of clocked sequential circuits, State reduction & assignment, Design procedure.  **UNIT – V**  **REGISTERS AND COUNTERS:** Registers, Shift registers, Ripple counters, Synchronous counters, other counters– Ring and Johnson counters.  **UNIT-VI**  **MEMORY AND PROGRAMMABLE DEVICES:** Random-Access Memory, Memory Decoding, Error detection and correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices. |
| **Text Books and Reference Books** | **TEXT BOOKS:**   1. Digital design by Morris Mano, Pearson Education Asia 2. Fundamentals of logic design by Roth & Charles,2nd Edition, West Publishing Company, 1979   **REFERENCE BOOKS:**   1. Fundamentals of logic circuits by A. Anand Kumar, PHI Learning 2. Jon M, Yarbrough, “Digital logic - applications and design”, Thomson -Brooks India edition. |
| **E- Resources** | <http://nptel.ac.in/cources>  https:// iete-elan.ac.in  https://freevideolectures.com/university/iitm  https://www.youtube.com/watch?v=pJrqIgAM0o4&list=PLnSlSuYL9wG7C7Jk\_mbXQ0LC0o7HQRsMD  https://www.youtube.com/watch?v=K73N9ES\_8nI |