2IT01: DIGITAL ELECTRONICS
CREDITS – 4 (LTP:3,0,1)

Course Objective:
To learn basic concepts of digital circuits and system, combinational and sequential circuits using digital logic fundamentals.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory		Practical		
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Number System and Binary Codes:** Binary Number System, Binary-to-decimal Conversion, Decimal-to-Binary Conversion, Octal Number, Hexadecimal Numbers, Classification of Binary Codes,8421 BCD Codes, Ex-3 Code, Gray Code, Signed and Unsigned Binary Number,1's and 2's Complements.	06
2	**Digital Logic Gates And Families:** The Basic Gates-AND, OR, NOT, Universal Logic Gates-NAND, NOR Exclusive-OR and Exclusive-NOR, Positive and Negative Logic, Transistor Logic, Integrated Injection Logic, Emitter Couple Logic, MOS Logic, COMS Logic.	06
3	**Boolean Algebra and Mapping Methods:** Boolean Laws, Duality, SOP and POS Form, Reducing Boolean Expression, Converting AND/OR/INVERT to NAND/NOR Logic, Karnaugh Map, Don't care Condition, Simplification of Boolean Expression using Karnaugh Map.	06
4	**Combinational Circuits:** Half and Full Adder, half and Full Subtractor, 4-Bit Binary Parallel adder, Binary Subtractor, BCD and EX-3 adder and Subtractor, CODE Conversion, Parity Generator/Checker, Magnitude Comparator, Decoder/Encoder, Application of Decoder/Encoder, Multiplexer/De- Multiplexer , Application of Multiplexer/De- Multiplexer.	10
5	**Programmable Logic Device, Memories and Converters:** Introduction to Programmable Logic Device, Read Only Memory, Programmable Logic Array, Programmable Array Logic, Classification of memories, ADC mechanism and types, DAC mechanism and types.	06
6	**Sequential Circuits:** Latches and Flip-Flop, SR Flip-Flop, Gated Flip-Fledge-Triggered SR Flip-Flop, Edge-Triggered D Flip-Flop, Edge-Triggered T Flip-Flop, Flip-Flop Excitation Table, Conversion of Flip-Flop, Introduction to Shift Registers, Buffer Register, SISO,SIPO,PISO,PIPO Shift Register, Universal Shift Register.	06

Unit No.	Topics	Teaching Hours
7	**Counter Design And Its Applications:** Asynchronous and Synchronous Counter, Design of Asynchronous Counter, Effect of Propagation Delay in Ripple Counter, Design of Synchronous Counter, Ring Counter and Twisted Ring Counter.	05
	Total	**45**

List of References:

1. Stephen Brown, "*Fundamentals of digital logic design with VHDL"*, TMH, 2nd edition, 2006.
2. R.P. Jain, "*Modern digital electronics"*, TMH Publication, 3rd edition, 12th reprint, 2007.
3. A. Anand Kumar, "*Fundamentals of digital circuits*", PHI publication, 3rd edition, 2014.
4. Wakerly Pearon, "*Digital Design: Principles and Practices*", PHI, 4th edition, PHI, 2006.
5. Jayaram Bhaskar, "*VHDL Primer*", PHI Publication, 3rd Edition, 2009.
6. Mark Bach, "*Complete Digital Design*", Tata MCGraw Hill, 2005.
7. Volnei Pedroni, "*Digital Electronics and Design with VHDL*", Elsevier science, 2008.

Course Outcomes (COs):

At the end of this course students will be able to …

1. Analyze the structure of various number systems and its applications.
2. Study the fundamental concepts and techniques used in digital circuit design.
3. Analyze and design various combinational & Sequential circuits.
4. Design various counters and its applications.
5. Develop skills to build and troubleshoot digital circuits.
6. Analyze and design application for a cost effective solution.