BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2EC04: DIGITAL SYSTEM DESIGN
CREDITS - 3 (LTP:3,0,0)

Course Objective:
The students need to learn basic concepts of digital circuits and system which leads of complex digital system such as microprocessors. The student needs to know 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	100
3	0	0	3	60	40	00	00	

Course Contents:

Unit No.	Topics	Teaching Hours
1.	**Introduction to logic families :** Digital IC Specification Terminology, Positive and Negative Logic, Transistor Logic, Open collector gates, Integrated Injection Logic, Emitter Coupled Logic, MOS Logic, COMS Logic.	04
2.	**Combinational Circuits:** 4-Bit Binary Parallel adder and Subtractor, BCD and EX-3 adder and Subtractor, CODE Converter, Parity Generator/Checker, Magnitude Comparator, Decoder/Encoder, Application of Decoder/Encoder, Multiplexer/De- Multiplexer , Application of Multiplexer/De- Multiplexer, Modular design using IC chips.	10
3.	**Sequential Circuits:** Latches and Flip-Flops, SR Flip-Flop, Edge-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 Sift Register. 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.	12
4.	**State Machines :** The finite state model: State diagram, State table, State reduction, State assignment, Transition and Output table, Excitation table. Memory Elements, Mealy and Moore machines representation, Implementation of serial binary adder, Sequence detector, Design counter using Moore and melay type finite state machine.	06
5.	**Programmable Logic Device and Memories :** Introduction to Programmable Logic Device, Read Only Memory, Programmable Logic Array, Programmable Array Logic. The role of memory in a computer system, Memory types and terminology, Semiconductor RAMS, Memory expansion, Non-volatile RAMS, Sequential Memories, Magnetic Memories.	08

Unit No.	Topics	Teaching Hours
6.	**Analog to Digital and Digital to Analog converter :** Digital to Analog conversion, R-2R Ladder type DAC, Weighted- resister type DAC, Analog to digital conversion, Counter type ADC, Tracking type ADC, Flash type ADC, Dual slope type ADC, Successive approximation type ADC.	05
	Total	**45**

List of References:

1. David J. Comer (1995), 3rd edition, "*Digital Logic and State Machine Design*", oxford university press.
2. M. Morris Mano , Michael D. Ciletti, "*Digital Design*", 2009, 4th edition, Pearson.
3. R. P. Jain, "*Modern digital electronics*", 2007 , 3rd edition, TMH.
4. A. Anand Kumar, "*Fundamentals of Digital Circuits*", 4th edition, 2016, PHI.
5. B. Somanathan Nair, *"Digital Electronics and Logic Design"* 2006, 6th edition, PHI.

Course Outcomes (COs):

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

1. To understand various logic families and selection of logic families as per the application.
2. Detailed understanding of the fundamental concepts to design digital system.
3. The ability to understand, analyze and design various combinational circuits.
4. The ability to understand, analyze and design various sequential circuits.
5. To understand role of memory in computer system.
6. Understand the architectures of various data converters.