Course: BTech **Semester:** 3

Prerequisite: : Basic Electronics |

Rationale: This course is design to provide basic ideas of computer architecture. This course also makes help to understand organization and architecture of computer. It will help to develop their logical abilities.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	0	3	20	20	-	60	-	100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	**Fundamentals of Digital Systems and logicfamilies :**Digital signals, digital circuits, Number Systems:binary, signed binary, octal, hexadecimal number, binary arithmetic, onẻs and twȯs complements arithmetic, codes, BCD arithmetic ,error detecting and correcting codes, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, examples of IC gates, characteristics of digital lCs, Digital Logic families:TTL and CMOS logic, interfacing CMOS and TTL.	15	7
2	**Minimization Techniques:**Boolean Algebra, Boolean postulates and laws, De-Morgaṅs Theorem, Principle of Duality, Boolean expression, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), K-map representation, simplification and minimization of logic functions using K-map. Doṅt care conditions and Quine-McCluskey Method of minimization. Variable Entered Maps, Realizing Logic Function with Gates.	20	8
3	**Combinational Digital Circuits:**Binary Adders and Subtractors, Parallel binary adder & subtractor, Serial adder, BCD adder, Carry look ahead adder, Multiplexer/De Multiplexer, Encoder/Decoders, Popular MSI chips, Magnitude comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices.	20	9
4	**SEQUENTIAL CIRCUITS:**A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J- K-T and Dtypesflip flops, applications of flipflops, shift registers, Applications of shift registers, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters,special counter ICs, asynchronous sequential counters, applications ofcounters.	20	9
5	**A/D and D/A Converters:**Digital to analog converters: weighted resistor/converter, R-2R Ladder, examples of D to A converters ICs, Analog to Digital converters: successive approximation, A/D converter, dual slope A/D Converter, Example of A/DConverterICs.	10	5
6	**Semiconductor Memories And Programmable Logic Devices:**Classification and characteristics of memories, Content addressable memory (CAM), commonly used memory chips, Introduction of PLD,ROM as a PLD, Programmable logic array, Programmable array logic, Complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA)	15	7

Reference Books

1.	**Modern Digital Electronics** By R. P. Jain | Tata McGraw-Hill Education
2.	**Digital Logic and Computer Design** By Morris Mano | PHI
3.	**Fundamentals of Digital Circuits** By Anand Kumar | Prentice-Hall of India Private Limited, New Delhi (2006)

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Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	0	1	-	-	20	-	30	50

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Course Outcome

After Learning the Course the students shall be able to:

After Learning the course the students shall be able to:
1. Identify and Explain the digital number system and also able to justify the practical application of number system.
2. Understand and Explain different logic gates and codes and also how to use them in real word application.
3. Realize the minimization techniques of digital Circuits.
4. Design different Adders, Subtracters, Multiplexers, decoders and many more circuits
5. Apply the theoretical knowledge to design flip-flops, counters and many more sequential circuits.
6. Identify and illustrate specifications of different logic families and memories and analyze them in critical way.

List of Practical	
1.	**To Study and Testing of various Logic Gates ICs.** To Study and Testing of various Logic Gates ICs.
2.	**Configuring NAND and NOR logic gates as universal gates.** Configuring NAND and NOR logic gates as universal gates.
3.	**Design Logic Gates using TTL Logic Gamily.** Design Logic Gates using TTL Logic Gamily.
4.	**Study and Implementation of Boolean Logic Functions and combinational circuits like Adder/ Subtractor, Code Converters, using Logic Gates.** Study and Implementation of Boolean Logic Functions and combinational circuits like Adder/ Subtractor, Code Converters, using Logic Gates.
5.	**Study and Implementation of Boolean Logic Functions and combinational circuits like Multiplexers/De-Multiplexres using Logic Gates.** Study and Implementation of Boolean Logic Functions and combinational circuits like Multiplexers/De-Multiplexres using Logic Gates.
6.	**Study and Implementation of Boolean Logic Functions and combinational circuits like Encoders/ Decoders, using Logic Gates.** Study and Implementation of Boolean Logic Functions and combinational circuits like Encoders/ Decoders, using Logic Gates.
7.	**Study and configure of flip-flop using digital ICs. Design digital system using these circuits.** Study and configure of flip-flop using digital ICs. Design digital system using these circuits.
8.	**Study and configure of registers and counters using digital ICs. Design digital system using these circuits.** Study and configure of registers and counters using digital ICs. Design digital system using these circuits.
9.	**Study and Design A to D / D to A converters.** Study and Design A to D / D to A converters.
10.	**Introduction to FPGA / CPLD. Implementation of digital circuits studied in previous sessions using PLD/ CPLD / FPGA** Introduction to FPGA / CPLD. Implementation of digital circuits studied in previous sessions using PLD/ CPLD / FPGA