D. Syllabus Detailing and Learning objectives

Module	Chapter	Detailed Content	Syllabus Detailing	Learning Objectives
Module 1	Biasing of BJT	Biasing of BJT: DC operating point, BJT characteristics & parameters, all biasing circuits, analysis of above circuits and their design, variation of operation point And its stability. Differential Amplifier, constant current source, Current mirror.	**Purpose**: To make students understand and develops the fundamental understanding of transistor as a BJT. It gives an idea of types of transistor, the characteristics and the biasing. **Scope –** **1. Academic Aspects-** Understanding fundamental of transistor as BJT and its characteristics along with I/O characteristics. **2. Technology Aspect-** Understand basics electronics devices. **3. Application Aspect-** Application of electronic devices in computer organization. **Students Evaluation** – 1. Theory Questions to be asked on BJT characteristics . 2. Case study to be given to differentiate between common emitter and common base configuration of BJT.	1. To describe the characteristics and parameters of BJT**(R)** 2.To explain diff amplifier with constant current source **(U)** 3. To Differentiate Between common collector and common emitter biasing of transistor. **(A)** 4. To identify different types of amplifier and explain differential amplifier.**(AN)**
	Number System and codes	Introduction to Number systems, Binary Number systems, Signed Binary Numbers, Binary, Octal, Decimal and Hexadecimal	**Purpose** – This chapter gives fundamental understanding of number systems and Boolean algebra. It gives an idea of various number systems such as Decimal, binary, octal, hexadecimal and their conversion. Apart from this it also introduces the concept of gray code, BCD code, Excess-3 code, ASCII code and Error Detection and Correction Codes.	1.To categorize various number representation systems. **[AN]** 2.To convert decimal number to another number system.**U]** 3. To Convert one type of code to another type.**[R]** 4. To solve and evaluate binary data

		number Systems and their conversion, Binary arithmetic using compliments, Gray Code, BCD Code, Excess-3 code, ASCII Code. inter-conversion of codes,	**Scope –** **1. Academic Aspects-** Learning the insights of number systems their representation and conversion in digital computer. **2. Technology Aspect-**Implement adder and subtractor for binary data . **3. Application Aspect-** Application of number systems and their representation in computer data. **Students Evaluation** 1. Questions on number system and arithmetic can be asked. 2. Implementation of arithmetic circuit can be evaluated in lab. 3. Students can apply complement number to solve problems on binary substratction.	arithmetic by using complements (1's and 2's) . **(E)** 5.To Convert given number system into another number system . **(U)** 6. To explain different types of codes . **(A)** 7.Compare weighted and non weighted code . **[U]**
Module 3	Boolean Algebra and Logic gates	Introduction, NAND and NOR operations, Exclusive –OR and Exclusive –NOR operations, Boolean Algebra Theorems and Properties , Standard SOP and POS form, Reduction of Boolean functions using Algebric method, K	**Purpose-** This chapter is focused on the basis for modern digital computer systems. This explains how computer systems operate you will need to understand digital logic and Boolean algebra. Also Boolean algebra is explained in this module which helps to solve different Boolean expressions by using different theorems. **Scope –** **1. Academic Aspects-** Understanding the operation of various logic gates , Boolean algebra and solving logic expressions using Boolean algebra. **2. Technology Aspect-** Design logic circuits using basic and universal gates for both SOP and POS forms. **3. Application Aspect-** Students should understand to minimize logic circuits to reduce IC count and complexity.	1. Minimize logic expression using Boolean algebra theorems . **(R)** 2. List the Boolean theorems and explain their roles. **(U)** 3. Draw the four variable K-map structure and list possible grouping of 1's. **(R)** 4. Illustrate the use of don't care condition in K-map.**(AN)** 5.Compare minterm and maxterms.**(AN)**

		-map method (2,3,4 Variable).Variable entered Maps, Quine Mc Cluskey, Mixed Logic Combinational Circuits and multiple output function Basic Digital Circuits: NOT,AND, OR,NAND,NOR,EX-OR,EX-NOR Gates.	**Students Evaluation –** 1. Theory Questions to be asked on Boolean algebra and reduction of logic function using K-map. 2. Lab experiments for design of Boolean expressions for various devices.	6. Differentiate SOP and POS from of logic function **(U)** 7. Design a control unit using microcode **(C)**
	Design and Analysis of Combinational Circuits	Introduction, Half and Full Adder, Half and Full Subtractor, Four Bit Binary Adder, One digit BCD Adder, code conversion, Encoder and Decoder ,Multiplexers and Demultiplexers, Decoders, Binary comparator (2,3 variable)4-bit Magnitude Comparator IC 7485 And ALU IC74181.	**Purpose-** This chapter develops the fundamental understanding and design of different combinational circuits such as adder(half/full) , subtractor, code converters, multiplexer, demultiplexer, comparators etc.. **Scope -** **1. Academic Aspects-** Understanding the characteristics of combinational circuits , different examples of combinational circuits . **2. Technology Aspect-** Design of combinational circuits using basic logic gates **3. Application Aspect-** Students should understand how to design combinational circuits. **Students Evaluation –** 1. Theory Questions to be asked on half adder, full adder, subtractor, comparator , encoder , decoder , mux & demux. 2. Lab experiments for implementation half and full adder, mux & demux , encoder and decoder. 3. Corresponding viva questions can be asked for characteristics of combinational circuits.	1. Describe Combinational circuit. **(R)** 2. Classify the multiplexers and show their usage in computer. **(A**) 3. Draw the logic diagram of 2 bit BCD adder using 7483.**(AN)** 4. Describe comparator and classify their types. **(U)** 5. Estimate the hit ratio of cache memory while mapping with main memory. **(E)** 6. Design multiplexer using basic logic gates. **(C)** 7. Explain the concept of combinational circuits and show how can be implemented practically. **(A)**

Module 5	Sequential Logic Design	Flip Flops : SR, JK, D, T, master slave flip flop, Truth Table, excitation table and conversion Register: Shift register, SISO, SIPO, PISO, PIPO, Bi-directional and universal shift register. Counters: Design of synchronous and asynchronous ,Modulo Counter, Up Down counter IC 74193, Ring and Johnson Counter	**Purpose –** This modules explains , sequential logic is a type of logic circuit whose output depends not only on the present value of its input signals but on the sequence of past inputs, the input history. Sequential logic is combinational logic with memory. Sequential logic is used to construct finite state machines, a basic building block in all digital circuitry, as well as memory circuits and other devices. **Scope –** **1. Academic Aspects-** Understanding sequential circuit and their design. **2. Technology Aspect-** Understand basics of flip flops and their use. **3. Application Aspect-** Understand use of flip flop in design of Counters and shift registers. **Student Evaluation -** 1. Theory Questions to be asked on flip flops, counters and registers. 2. Explaining use of flip flop as memory unit..	1. To describe the fundamental unit of sequential circuit and explain different types of flip flops . **(R)** 2. To list and explain different types of counters.**(U)** 3. To draw and explain the block diagram of shift registers. **(R)** 4. Compare types od counters and summarize their performance. **[AN]** 5. Discuss the sequential circuits and their use..**(U)**
Module 6	VHDL	Introduction to VHDL, Library, Entity, Architecture Modeling styles, Concurrent and Sequential statements, data objects and data	**Purpose –** This Module explains VHDL (Very High Speed IC Hardware description Language) , one of the Standard hardware description language used to design digital systems. VHDL can be used to design the lowest level (gate level) of a digital system to the highest level (VLSI module). VHDL though being a rigid language with a standard set of rules allows the designer to use different methods of design giving different perspectives to the digital system .	1. To describe and identify use of VHDL. **(AN)** 2 Describe concurrent and sequential statements. **(AN)** 3. List the features of VHDl. **(R)**

		types, attributes, design examples for combinational circuits	**Scope –** **1. Academic Aspects-** Understanding VHDL . **2. Application Aspect-** Translate real world problem to digital logic formulations using VHDL **Student Evaluation -** 1. Theory Questions to be asked on basics of VHDL 2. Explanation architecture and sequential statements .	4.Explain various architectures used in VHDL .**[U]** 5. Define entity and identify various input types for a digital circuit.**(AN)**