MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

B.Tech. II Semester (Electronics and Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
2200221	DC	Digital Circuits & Systems	60	20	20	60	20	20	200	3	-	2	4

Digital Circuits & Systems (2200221)

Course Objective: To understand the concept of digital systems, design& analyze the combinational and sequential logic circuits.

Unit I: Boolean algebra and switching functions: Minimization of Boolean functions, Canonical & standard form, concept of prime implicant etc. Karnaugh's map method, Quine-McCluskey's method, Universal gates, NAND/NOR realization of Boolean functions.

Unit II: Combinational Logic circuits: Half adder, Half subtractor, Full adder, Full subtratctor circuits. Serial and parallel adder, BCD adders, look-ahead carry generator, Code Converters, Decoders, Encoders, Multiplexers & demultiplexers.

Unit III: Sequential Circuits: Latches, Flip-flops - SR, JK, D, T, and Master-Slave, Characteristic table and equation, Application table, Edge triggering, Level Triggering, Realization of one flip flopusing other flip flops, Multivibrators**:** Monostable, Astable, Bistable (transistorized).

Unit IV: Registers and Counters: Asynchronous Ripple or serial counter, Asynchronous Up/Down counter, Synchronous counters, Synchronous Up/Downcounters, Programmable counters, Design of Synchronous counters: State diagram, State table, State minimization, State assignment, Excitation table and Maps Circuit, Implementation: Modulo-n-counter, Registers:Shift registers, Universal shift registers, Shift register counters, Ring counter, Shift counters, Sequence generators.

Unit V: Logic Families: RTL, DTL, all types of TTL circuits, ECL, HTL and PMOS, NMOS & CMOS logic etc. Comparison of various logic families, ROM organization- PROM, EPROM, EEPROM, EAPROM, RAM organization- Static RAM, Dynamic RAM.

Text Books:

1. Digital Design: M. Mano, 4th Edition**,** Prentice Hall of India.
2. Logic & Computer Design Fundamental: M.Mano, 5th Edition, Pearson Education India.
3. Digital Circuits and Design: S. Salivahanan,5th Edition**,** Oxford University Press.

Reference Books:

1. Digital Electronics: W.H. Gothman, Prentice Hall of India.
2. Digital System Principles & Applications: R.J. Tocci,11th Edition**,** Pearson Education India.
3. Pulse, Digital & Switching Waveforms: Millman&Taub,McGraw Hill Education.

Course Outcomes

After the completion of this course students will be able to:

- **CO1. Implement** the Boolean expression using basic and universal logic gates.
- **CO2. Design** different combinational logic circuits
- **CO3. Design** various latches and flip-flops
- **CO4. Design** various shift registers and counters using flip-flops.
- **CO5. Analyze** different types of logic families, semiconductor memories, & multivibrators.

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Subject Name: Digital Circuits and Systems

Subject Code: 2200221

List of Experiments

1. To Implement logic gates – NAND,AND,NOR,EX-OR,EX-NOR.
2. To construct the basic gates using universal gates.
3. To verify the truth table of half adder and full adder.
4. To verify the truth table of half and full subtractor.
5. To Design R-S flip flop.
6. To Design a J-K flip flop.
7. To examine parity generator/checker circuit.
8. To design ripple counter using J-K Flip Flop.

Course Outcomes:

After completing the lab, students will be able to:

CO1. Verify the operation of basic logic gates.
CO2. Construct the basic gates by using universal gates.
CO3. Develop half adder and full adder circuits using their truth table.
CO4. Develop the D, RS and JK flip-flops and verify their operation.
CO5. Design Counters.

Skill based mini Project

1. Design and simulation of up-counter circuit.
2. Design and simulation of down counter circuit.
3. Design and simulation of flip-flops.
4. Design and simulation of latches.
5. Design and simulation of ring counter.

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			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
2200222	DC	Electronic circuit	60	20	20	60	20	20	200	2	1	2	4

Electronic Circuit (2200222)

Course Objective: To understand different semiconductor circuits and grab the way to design circuits and perform measurements of circuit parameters.

Unit I: Diode Circuits: Review of P-N Junction Diodes, Power supply parameters, SMPS, Zener and Avalanche Breakdown, Zener voltage regulator, series pass regulator (with feedback) and shunt voltage regulators, Short circuit protection.

Unit II: Introduction to BJT Biasing and Stability: Review of BJTs, Transistor biasing and bias stabilization, the operating point, stability factor, analysis of fixed base bias, Voltage divider bias, collector to base bias, Emitter resistance bias circuit and Bias compensation techniques.

Unit III: BJT as an Amplifier:Low frequency BJT amplifiers, equivalent circuit of BJT using h parameter for CB, CE, CC configurations, calculation of transistor parameter for CB, CE, CC using h parameters. High frequency BJT amplifier: Hybrid-pi (π) common emitter transistor model, hybrid – π conductance and capacitance, gain-bandwidth product.

Unit IV: Feedback amplifiers: Introduction to Feedback Amplifiers & their design parameters, comparison of different feedback amplifier configuration viz (gain, input impedance, output impedance, current gain, voltage gain), cascading of BJT amplifier, Darlington Pair.

Unit V: Oscillators and Tuned Amplifiers: Barkhausen criterion, Sinusoidal oscillators, L-C (Hartley-Colpitts) oscillators, RC phase shift, resonant oscillator, Wien Bridge and crystal oscillators, Clapp oscillator, Tuned amplifier design using BJTs.

Text Books:

1. Microelectronic Circuits:Theory and Application: Sedra& Smith,7th Edition, Oxford University Press.
2. Electronics Devices and Circuits: Boylested&Nashelsky,11th Edition, Pearson Education India

Reference Books:

3. Electrical Engineering material: A.J Dekker, 1st Edition, Prentice Hall of India.
4. Micro Electronics: Millman, &Grabel,2nd Edition, McGraw Hill Education
5. Integrated Electronics: Millman&Halkias,McGraw Hill Education.

Course Outcomes

After the completion of this course students will be able to:

- CO 1. **Design** different diode circuits.
- CO 2. **Design** the biasing circuits for BJTs.
- CO 3. **Examine** the working of BJT amplifiers.
- CO 4. **Analyze** the different parameters of feedback amplifiers.
- **CO 5.** **Design** the Oscillator and Tuned amplifier circuits.

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Electronic Circuit

List of Experiment

1. To design a voltage regulator using BJT and Zener Diode.
2. To design BJT as a switch.
3. To design a Common Emitter amplifier and determine its voltage gain and output resistance.
4. To determine the gain and bandwidth of 2-stage RC coupled amplifier.
5. To verify the working operation of Crystal Oscillator.
6. To analyse the working of RC Phase shift Oscillator using BJT.
7. To analyse the working of Hartley and Colpitt's Oscillators.
8. To analyse the working of Clapp Oscillator.

Course Outcomes:

After completing the lab, students will be able to

CO1.	Design the voltage regulator with specific voltage range.
CO2.	Design the BJT as a switch
CO3.	Implement the voltage amplifier using BJT.
CO4.	Analyse the RC and LC oscillator using BJT.
CO5.	Analyse Clapp oscillator using BJT.

Skill based mini projects

Subject Name: Electronic Circuit Design

1. Design a +5V/+9/+12 V regulated power supply on PCB.
2. Design an oscillator circuit to generate 1 kHz sine wave on PCB.
3. Design BJT as a switch using LED on PCB.

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B.Tech. III Semester (Electronics and Telecommunication Engineering)

Subject Code	Category Code	Subject Name	Theory Slot			Practical Slot			Total Marks	Contact Hr/week			Total Credits
			End Sem Marks	Mid Sem Marks	Quiz/ Assignment Marks	End Sem Mark	Lab work & Sessional Mark	Skill based mini project		L	T	P	
2200223	DC	Signals & Systems	60	20	20	-	-	-	100	3	-	-	3

Signals & Systems (2200223)

Course objective: Coverage of continuous and discrete-time signals and systems, their properties and representations and methods that is necessary for the analysis of continuous and discrete-time signals and systems.

Unit-1 Introduction: Mathematical Description of Continuous & Discrete– Time Signals Definition, Classification of signals, Complex Exponential and Sinusoidal Function; Unit Step, Signum, Unit Ramp, Unit Impulse, Periodic Impulse or Impulse Train, Rectangle, Triangle, Sinc and Gaussian pulse functions, Even and Odd Functions, Periodic and non periodic Functions, Signal Energy and Power, Scaling and Shifting, Amplitude Scaling, Time Shifting, Differential and Integration.

Unit 2 Fourier series and Fourier transform: Fourier Transform: Exponential Fourier series, and Trigonometric Fourier series, properties of Fourier series, Introduction to Fourier transform, Fourier Transforms of elementary functions. Properties of Fourier Transform.

Unit 3: Z transforms: Introduction to Z-transform, relation between Laplace and Z-transform, relation between Fourier transform and Z-transform, ROC, properties of ROC, Properties of Z-transform, Inverse Z-transform, Unilateral Z-transform.

Unit-4 Properties of Continuous and Discrete Time Systems: System Modeling, System Properties, Homogeneity, Time Invariance, Additivity, Linearity & Superposition, Stability, Incremental Linearity, Causality, Memory, Static, Nonlinearity, Inevitability, continuous & discrete LTI system.

Unit-5 Continuous and Discrete system analysis: The Convolution Integral, and Convolution Sum, Impulse Response, Convolution & Properties, System Interconnections, Stability and Impulse Response, Response of Systems to Standard Systems, Realization of Differential Equations, Analysis of discrete time LTI system using Z-transform, Analysis of continuous time LTI system using Laplace transform.

Text Books:

1. Digital Signals and Systems, 2nd Edition: Simon Haykin, Barry Van Veen, 2nd Edition, Wiley India Pvt. Ltd.

2. Signals and Systems: Hwei. P. Hsu, Schaum's outlines, 2 nd Edition, Tata Mcgraw Hill Education.

Reference Books:

1. Fundamentals of Signals & Systems: Michael J Roberts, 2 nd Edition, Mc Graw Hill Education.

2. Signal and Systems: Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, 2 nd Edition, Pearson Education India.

Course Outcomes

After the completion of this course students will be able to:

CO1. Describe mathematically the basic continuous-time and discrete along with their transformations.

CO2. Determine the spectral characteristics of continuous-time and discrete time signals using Fourier transform.

CO3. Develop the z-transform for analysis of discrete time signals and systems

CO4. Analyze the properties of continuous-time and discrete time signals.

CO5. Calculate the convolution and response of continuous-time and discrete time systems with respect to input.