MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

B.Tech. III Semester (Electronics 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	
140311	DC	Electronic circuit Design	60	20	20	60	20	20	200	2	1	2	4

Electronic Circuit Design (140311)

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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140312	DC	Digital Circuits & Systems	60	20	20	60	20	20	200	3	-	2	4

Digital Circuits & Systems (140312)

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, Halfsubtractor, Full adder, Full subtratctor circuits. Serieal 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.** **Simplify** the Boolean expression using minimization techniques
- **CO2.** **Implement** the Boolean expression using basic and universal logic gates.
- **CO3.** **Design** different combinational logic circuits
- **CO4.** **Design** various latches and flip-flops
- **CO5.** **Design** various shift registers and counters using flip-flops.
- **CO6.** **Analyze** different types of logic families, semiconductor memories, & multivibrators

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140313	DC	Network Theory	60	20	20	60	20	20	200	2	1	2	4

Network Theory (140313)

Course objective: To understand phasor diagrams of three phase circuits, Study of network theorem, transients analysis, graph theory of network, analysis of two port networks.

Unit-I Introduction to Circuit Elements, Characterization of Resistors, Capacitors & Inductors in Terms of their linearity & time dependence features, Characteristics of Independent & Dependent Sources, KCL & KVL for circuits with dependent & independent sources, Dot convention for coupled inductor and their characteristics, co-efficient of coupling.

Unit-II Network theorems - superposition, Thevenin, Norton, Millman, Reciprocity and Maximum Power Transfer theorems, problem with controlled sources, Network topology, concept of network graph, Tree, Tree branch and link, Incident matrix, cut set and tie set matrices.

Unit-III Transient analysis- Transients in RL, RC and RLC circuits, initial conditions, time constants, Steady state analysis – concept of phasor and vector, impedance and admittance, Node and mesh analysis of RL, RC and RLC networks with sinusoidal and driving sources, Resonance and Q-factor.

Unit-IV Transform Domain Analysis of Networks: The Laplace transform, Properties of Laplace transform,solution of differential equation using Laplace Transform, Initial and final value theorem. Waveform synthesis & Laplace Transform of various waveform function.

Unit-V Two Port Network: Concept of Ports, Network functions of one port & two ports, Calculation of network functions for one port and two port, Pole & zeros of network of different kinds, Two port parameters – Z, Y, hybrid and chain Parameters, Relationship between two port network parameters.

Text Books:

1. Network Analysis: M.E. Van Valkenberg, 3rd Edition, Prentice Hall of India.
2. Network and Systems: D. Roy Chaudhary, **2nd Edition,** New Academic Science Ltd.

Reference Books:

3. Introduction to Modern Network Synthesis: M.E. Van Valkenberg, Prentice Hall of India.
4. Network Analysis & Synthesis: F. Kuo, 2nd Edition, Wiley & Sons.
5. Network Analysis & Synthesis: Ravish R Singh, 1st Edition, McGraw Hill Education.

Course Outcomes

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

- **CO1. Analyze** the circuits using Kirchoff's law and Network simplification theorem.
- **CO2. Solve** circuits using Tree, Node, Branch, cut-set and Tie set methods.
- **CO3. Evaluate** transient response and steady state response.
- **CO4. Examine** RL, RC and RLC circuits (DC and AC) using Mesh and Nodal analysis techniques.
- **CO5. Apply** the Laplace transform to linear circuits and systems.
- **CO6. Determine** ABCD, Z,Y and h parameter of an electrical circuits.

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140314	DC	Signals & Systems	60	20	20	-	-	-	100	3	-	-	3

Signals & Systems (140314)

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 & amp; 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.

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Skill based mini project

Subject Name: Analog Electronics

1. To design and simulate a +5V/+9/+12 V regulated power supply.
2. To design and simulate Voltage Doubler Circuit.
3. To design and simulate Voltage Tripler Circuit.
4. To design and simulate a single stage RC coupled amplifier circuit.
5. To design and simulate a oscillator circuit to generate 1 kHz sine wave.

Subject Name: Digital Circuits & Systems

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.

Subject Name: Network Theory

1. Smart Fan Circuit.
2. Beeper Circuit.
3. Water Level Indicator.
4. Automatic Door Bell Ringer.
5. Rain Alarm.

Subject Name: Software Lab (Introduction to MATLAB)

1. Generation of wave of any given expression.
2. Calculator Design using MATLAB.
3. Draw and calculate the area of circle of given radius.
4. GUI model for various waveform generation and display.
5. GUI model for display of various transform of specific waves.