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-π (Giacoletto) 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.

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	
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, 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,Race around condition Characteristic table and equation, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop using other flip flops.

Unit IV: Registers and Counters: Asynchronous Ripple or serial counter, Asynchronous Up/Down counter, Synchronous counters, Synchronous Up/Downcounters, 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, Sequence generators, Johnson Counter.

Unit V: Logic Families: Diode and transistor as a switch, FET as a switch, specifications for Logic Families, RTL, DCTL, IIL, DTL, all types of TTL circuits, ECL, HTL and PMOS, NMOS & CMOS logic, Comparison of various logic families.

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.

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

Network Theory (140313)

Course objective: To understand basic electric circuits, study of network theorems, transient analysis, graph theory, analysis of two port networks.

Unit-I Introduction – Basics of 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, Network topology, concept of network graph, Tree, Twigs and link, Incident matrix, Cutset and Tieset matrices.

Unit-III Transient analysis- Transients in RL, RC and RLC circuits, initial conditions, time constants,Steady state analysis, Node and mesh analysis of RL, RC and RLC networks with sinusoidal sources.

Unit-IV Laplace Transform & Passive Filters: 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, Low pass, high pass, band pass and band elimination filters,

Unit-V Two Port Network: Concept of Ports, Calculation of network functions for one port and two port, Two port parameters– Z,Y, hybrid and chain Parameters, Relationship between two port network parameters, π networks, Characteristics impedance & propagation constant.
T and

Text Books:

1. NetworkAnalysis:M.E.VanValkenberg,3rdEdition,PrenticeHallofIndia.
2. NetworkandSystems:D.RoyChaudhary,**2ndEdition,**NewAcademicScienceLtd.

Reference Books:

3. IntroductiontoModernNetworkSynthesis:M.E.VanValkenberg,PrenticeHallofIndia.
4. NetworkAnalysis&Synthesis:F.Kuo,2ndEdition,Wiley&Sons.
5. NetworkAnalysis&Synthesis:RavishRSingh,1stEdition,McGrawHillEducation.

Course Outcomes

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

CO1. Analyze thecircuits usingKirchoff`slaws.
CO2. Apply Network theorems and concept of graph theory for simplification of circuits. .
CO3. Evaluate transient response and steady state response.
CO4. Apply the Laplace transform to linear circuits and systems.
CO5. Determine ABCD,Z,Y and h-parameter of an electrical circuits.

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	
140314	DC	Analog Communication	60	20	20	-	-	-	100	3	-	-	3

Analog Communication (140314)

Course objective: To understand the concept of modulation, various types of modulation, application, standards, analysis of modulation and demodulation process, probability theory and probability function, and concept of noise.

Unit I: Spectral Analysis: Introduction to signals and classifications, Introduction to Fourier series, Introduction to Fourier Transforms and its properties, Fourier transform of important functions, Autocorrelation, Cross correlation and their properties.

Unit II: Amplitude Modulation: Needs of modulation, Amplitude modulation, SSB, DSB,VSB suppressed carrier modulation, Modulation techniques their generation, detection and spectral analysis, square law modulators, switching modulator, envelope and square law detector, balanced modulator, Superhetrodyne receiver, Power calculation for AM, DSB-SC & SSB-SC, FDM.

Unit II Angle Modulation: Relationship between Frequency and phase modulation, frequency and phase deviation, types of FM, comparison between NBFM & AM signal., Carson's rule, spectrum of FM signal, comparison of narrow band and wide band FM, generation and detection of FM. Pre-emphasis and de-emphasis, capture effect.

Unit IV Probability, and random variables: Random variable, sample space and events, probability and its properties, distribution function, discrete random variable and probability mass function, continuous random variable and probability density function, cumulative distribution function, probability density function, statistical average, variance, moment, Distributions: Binomial, Poisson, Gaussian and Rayleigh probability density function.

Unit V Noise Analysis: Various sources of noise, types of noise with their characteristics, Mathematical representation of noise figure, Noise bandwidth, Noise temperature and noise figure of amplifiers in cascades, Figure of merit of modulation techniques, comparison of modulation scheme for noise.

Text Books:

1. Communication System: Simon Haykins, Wiley & Sons.
2. Communication Systems - B. P. Lathi, BSP Publication

Reference Books:

1. Electronic Communication System: Kennedy-Devis, Tata McGraw-Hill Education.
2. Modern Digital & Analog Communication System: B.P. Lathi ,Oxford University Press.
3. Principles of Communication System: Taub and Schilling McGraw-Hill Education.

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

CO1. Analyze the frequency domain representation of various signals.
CO2. Describe amplitude modulation, their generation & detection methods.
CO3. Explain the generation and detection techniques for angle modulated signal.
CO4. Evaluate the statistical parameters for general PDF/CDF.
CO5. Evaluate the effects of noise on modulation techniques

L	T	P	C
-	-	2	1

Subject Name: Electronic Circuit Design
Subject Code: 140311

List of Experiment

1. Design a voltage regulator using BJT and Zener Diode.
2. Study of BJT as a switch.
3. 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 LC Oscillator using BJT.
6. Analyse the working of RC Phase shift Oscillator using BJT.
7. Analyse the working of Clapp Oscillator.
8. Analyse the working of Tuned amplifier using BJT and plot its frequency response.

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. Plot and draw the frequency response of the Tuned amplifier.

B.Tech. III Semester (Electronics Engineering)

L	T	P	C
-	-	2	1

List of Experiments

Subject Name: DIGITAL CIRCUITS AND SYSTEMS
Subject Code: 140312

1. To convert given binary numbers to gray codes.
2. To Implement logic gates – NAND,AND,NOR,EX-OR,EX-NOR.
3. To construct the basic gates using universal gates.
4. To verify the truth table of half adder and full adder.
5. To verify the truth table of half and full subtractor.
6. To verify De-Morgan's Theorem.
7. To Design D-latch flip flop.
8. To Design R-S flip flop.
9. To Design J-K flip flop.
10. To examine parity generator/checker circuit.
11. To verify the truth table of one bit and four bit comparators using logic Gates and IC 7485.
12. To design ripple counter using J-K Flip Flop.
13. To design shift registers.

Course Outcomes:

After completing the lab, students will be able to:

CO1. **Verify** the operation of basic logic gates and DE Morgan's theorem using standard combinational logic.
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 and Registers.

Skill based mini projects

Subject Name: Electronic Circuit Design

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

Subject Name: Digital Circuits & Systems

1. To Design an up-counter circuit.
2. To Design a down counter circuit.
3. To Design the flip-flops.
4. To Design the latches.
5. To Design a ring counter.

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.