MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

B.Tech. I Semester (Electronics Engineering/ 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	
100022	BSC	Electronics Engineering materials	60	20	20	60	20	20	200	2	1	2	4

Basic Electrical & Electronics Engineering (100022)

Course Objectives:

- To impart the basic knowledge of the DC and AC circuits and their applications.
- To familiarize the students with the basic knowledge of magnetic circuits, transformer and its terminology.
- To make familiarize the students about the working of rotating electrical machine, various electronic circuits and its importance.

Unit I - D.C. Circuits Analysis:

Voltage and Current Sources: Dependent and independent source, Source conversion, Kirchhoff's Law, Mesh and Nodal analysis. Network theorems: Superposition theorem, Thevenin's theorem & Norton's theorem and their applications.

Unit II –Single-phase AC Circuits:

Generation of sinusoidal AC voltage, definitions: Average value, R.M.S. value, Form factor and Peak factor of AC quantity, Concept of Phasor, analysis of R-L, R-C, R-L-C Series and Parallel circuit, Power and importance of Power factor.

Unit III- Magnetic Circuits:

Basic definitions, AC excitation in magnetic circuits, self-inductance and mutual inductance, Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. Flux, MMF and their relation, analysis of magnetic circuits.

Unit IV- Single-phase Transformer &Rotating Electrical Machines:

Single phase transformer, Basic concepts, construction and working principal, Ideal Transformer and its phasor diagram at No Load, Voltage, current and impedance transformation, Equivalent circuits and its Phasor diagram, voltage regulation, losses and efficiency, testing of transformers, Construction & working principle of DC and AC machine.

Unit V - Digital Electronics, **Devices & Circuits:**

Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, Demorgan's theorem, Logic gates- symbolic representation and their truth table, Introduction to semiconductors, Diodes, V-I characteristic, Bipolar junction transistors and their working, Introduction to CB, CE & CC transistor configurations

Recommended Books:

1. Basic Electrical and Electronics Engineering, D.P. Kothari & I.J. Nagrath-Tata McGraw Hill
2. Basic Electrical and Electronics Engineering, S. K Bhattacharya -Pearson
3. Electrical Machinery- A.E. Fitzgerald, C. Kingsley and Umans - TMH
4. Principles of Electrical Engineering- Vincdent Del Toro- Prentice Hall.
5. Basic Electrical Engineering -A,E. Fitzgerald, Higginbotham and Grabel -TMH
6. Integrated Electronics- Millmann & Halkias

Course Outcomes

After the completion of the course, the student will be able to –

CO 1. **Solve** dc &ac circuits by applying fundamental laws & theorems

CO 2. **Compare** the behavior of electrical and magnetic circuits for given input

CO 3. **Explain** the working principle, construction, applications of rotating electrical machines

CO 4. **Explain** the working principle, constructional details, losses & applications of single phase transformer.

CO 5. **Select** the logic gates for various applications in digital electronic circuits.

CO 6. **Explain** characteristics of Diode and Transistor.

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Basic Electrical & Electronics Engineering Lab (100022)

LIST OF EXPERIMENT

1. To verify Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. To verify Superposition Theorem
3. To determine resistance & inductance of a choke coil.
4. To determine active & reactive power in a single phase A.C circuit.
5. To determine voltage ratio & current ratio of a single phase transformer.
6. To determine the polarity of a single phase transformer.
7. To perform open circuit & short circuit test on a single phase transformer.
8. To study multimeter& measure various electrical quantities
9. To study of constructional details of DC machine.
10. To determine the V-I characteristics of diode in forward bias & reverse bias condition.

Course Outcomes:

After the completion of the lab, the student will be able to -

CO 1. **Verify** circuit theorems.
CO 2. **Perform** tests on transformer for determination of losses, efficiency & polarity.
CO 3. **Acquire** teamwork skills for working effectively in groups
CO 4. **Prepare** an organized technical report on experiments conducted in the laboratory.

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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		L	T	P	
140122/200122	DC	Electronics Devices	60	20	20	-	-	100	2	1	-	3

Electronics Devices (140122/200122)

Course Objective: To understand construction, principal and operation of different semiconductor devices.

Unit I: Fundamental of Electronic Devices: Elemental & Compound Semiconductor Materials , Bonding Forces and Energy Bands in Intrinsic and Extrinsic Silicon, Charge Carrier in Semiconductors , Carrier Concentration, Extrinsic Semiconductor, Hall Effect, Mechanism of Current Flow, Drift Current, Diffusion Current, Einstein Relation, Continuity Equation.

Unit II: Semiconductors Diodes: P-N Junction properties, Diode Characteristics, Equilibrium condition, biased junction, Steady state condition, P-N Junction breakdown mechanism, Capacitance of junction barrier, Diode circuit parameters, Basic circuits of Rectifier, Clippers and Clampers.

Unit III: Bipolar Junction Transistors: Construction, basic operation, current components and equations, CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region.

Unit IV: Field effect transistors: Construction and characteristics of JFET, working principle of JFET.MOSFET construction and characteristics, MOSFET enhancement and depletion mode.

Unit V: Power Electronics Devices: Basic principle and working of SCR, IGBT, Uni-junction Transistor (UJT) and Thyristors. UJT: Principle of operation, characteristics.

Text Books:

1. Electronics Devices and Circuits: Boylested & Nashelsky, 11th Edition**,** Pearson Education India
2. Electronic devices and circuits: S. Salivahanan, 2nd Edition, Tata McGraw-Hill Education, 2011.
3. Microelectronic Circuits: Theory and Application: Sedra & Smith, 7th Edition**,** Oxford University Press.

Reference Books:

1. Micro Electronics: Millman, & Grabel, 2nd Edition, McGraw Hill Education
2. Integrated Electronics: Millman &Halkias, McGraw Hill Education.

Course Outcomes

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

- **CO1.** **Analyze** the properties of semiconductor materials.
- **CO2.** **Understand** construction and working of different diodes.
- **CO3.** **Analyze** the operation of Bi-polar junction transistors.
- **CO4.** **Examine** the working of Field Effect Transistors.
- **CO5.** **Analyze** the working of power electronics devices.

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B.Tech. I Semester (Electronics Engineering/ 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		L	T	P	
140123/200123	DC	Network Theory	60	20	20	-	-	100	2	1	-	3

Network Theory (140123/200123)

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**,** 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.

Unit-III Laplace Transform & Passive Filters: The Laplace transform, Properties of 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-IV 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-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, T and π networks, Characteristics impedance & propagation constant.

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:

1. Introduction to Modern Network Synthesis: M.E. Van Valkenberg, Prentice Hall of India.
2. Network Analysis & Synthesis: F. Kuo, 2nd Edition, Wiley & Sons.
3. 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 laws.
CO2. **Apply** Network theorems for the simplification of circuits. .
CO3. **Apply** the Laplace transform to linear circuits and systems.
CO4. **Evaluate** transient response and steady state response.
CO5. **Determine** ABCD, Z,Y and h parameters of an electrical circuit.

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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	
	ESC	Computer Programming	60	20	20	60	20	20	200	2	1	2	4

Computer Programming

COURSE OBJECTIVES:

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To study the concepts of procedural and object oriented programming.
- To design and implement basic programming solutions using programming constructs.

Unit I

Introduction to Programming, types of computer programming languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C++ Programming: Data Types, Constants, Keywords, variables, input/output, Operators & Expressions, Precedence of operators.

Unit II

Control Statements and Decision Making: goto statement, if statement, if-else statement, nesting of if statements, The switch statement, while loop, do...while loop, for loop, nesting of for loops, break and continue statement. Function Basics, Function Prototypes, Passing Parameter by value and by reference, Default Arguments, Recursion. Arrays: One dimensional Arrays, Multidimensional Arrays, Passing Arrays to Functions.

Unit III

Strings, Pointers, Structures and File handling:, operations on Strings, Basics of Pointers & Addresses, reference variable, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings. Dynamic memory allocation using new and delete operators. Structures & Union, Pointer to Structure, Self-Referential Structures. File Concepts, Study of Various Files and Streams, operations on files.

Unit IV

Object Oriented Paradigm, Features of OOPS, Comparison of Procedural Oriented Programming with Object Oriented Programming, Abstract Data Types, Specification of Class, Visibility Modes, Defining Member Functions, Scope Resolution Operator, Constructors, its types, and Destructors, Creating of Objects, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Friend Function.

Unit V

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading. Inheritance: Introduction, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath.

RECOMMENDED BOOKS:

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusamy.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES:

After completing this, the students will be able to:

CO1: identify situations where computational methods and computers would be useful.

CO2: develop algorithms and flowchart for a given problem.
CO3: understand the concepts of procedural programming.
CO4: explain the concepts of object oriented programming and its significance in the real world.
CO5: analyze the problems and choose suitable programming techniques to develop solutions.
CO6: develop computer programs to solve real world problems.

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B.Tech. I Semester (Electronics Engineering/ 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		L	T	P	
140124/200124	DLC	Devices & Network Lab	-	-	-	60	40	100	-	-	4	2

Devices & Network Lab (140124/200124)

Course Objectives:

Students will be able to learn the practical aspects of the basic electronic devices and also to verify the network theorems.

List of Experiment

1. Verify and plot the VI characteristic of PN junction and Zener Diode.
2. Design a half and full wave rectifier circuits.
3. Verify and plot the Input and Output characteristics of CE, CB,CC Configuration of BJT.
4. Verify and plot the Transfer and Output characteristics of CS, CG, CD Configuration of MOSFET.
5. Verification of KVL and KCL on bread board.
6. Verification of Thevenin‘s & Norton‘s Theorems.
7. Verification of Superposition Theorem.
8. Verification of Millman‘s Theorem.
9. Verification of Reciprocity Theorem.
10. Verification of Maximum Power Transfer Theorem.

Course Outcome:

After completing the course, students will be able to

CO1. Verify the characteristics of diodes, BJT and MOSFET.
CO2. Analyze circuits using Kirchauff’s laws and Network theorems.

B.Tech. II Semester (Electronics Engineering/ 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		L	T	P	
140212/200212	DC	Engineering Materials	60	20	20	-	-	100	3	1	-	4

Engineering Materials (140212/200212)

Course Objective: To introduce the student with different materials and their characteristics used in manufacturing various electrical and electronics equipment.

Unit 1 Introduction to Engineering Materials: Classification of Engineering Materials, Crystal Structure of The Material, Levels of materials, Structure-Property Relationships in Materials.

Unit 2 Conducting, Dielectric & Insulating materials: Conducting Material- Properties of Conductors, Characteristics of Good Conductor Material, Definition and classification of Dielectric and insulating material, Superconductor.

Unit 3 Semi Conductors: Introduction to Semi-Conductors and their Properties, Effect of Temperature on Semiconductors, Mechanism of Conduction in Electrons and Holes, Carrier Generation & Recombination. Intrinsic Semiconductors & its Atomic Model, Extrinsic Semiconductor Material & its Atomic Model, Type of Impurity: Pentavalent and Trivalent Impurities, Majority & Minority Charge Carriers, Mobile Charge Carrier & Immobile Ions, Mass-Action Law.

Unit 4 Energy Levels & Bands: Atomic Structure, Bohar's Theory of Hydrogen Atom, Excitation and Ionization of Atoms, Valence Band. Conduction Band and Forbidden Energy Gap, Energy Band for Insulators, Semiconductors and Conductors, Fermi Dirac Distribution Function, Fermi Level in Intrinsic and Extrinsic Semiconductors, Energy Band Gap.

Unit 5 Nonmaterial: Introduction of Nanomaterials, Classification of Nanomaterial, Electrical, Optical, Mechanical & Magnetic Properties, Methods for Creating Nanostructures, Applications & Advantages.

Text Books:

1. SK Bhattacharya, "Electrical and Electronic Engineering Materials"1st edition, Khanna Publishers, Delhi, 2006.
2. A.J. Dekker "Electrical Engineering Materials", Reprint 1st edition, PHI, 2006.
3. Nanomaterials – B. Viswanathan, published by Narosa Publishing House

Reference Books:

1. Sahdev, "Electrical Engineering Materials", Unique International Publications.
2. C. S. Indulkar & S. Thiruvengadam, "Electrical Engineering Materials", Reprint 1st edition, 2013, S. Chand & Com. Ltd, New Delhi -55
3. S.P. Seth, P.V. Gupta "A course in Electrical Engineering Materials", 4th Edition, 2017, Dhanpat Rai & Sons.
4. Nanomaterials – An introduction to synthesis, properties and application, Environmental Engineering and Management Journal, 2008, Vol. 7, No.6, 865-870.

Course Outcome:

After successful completion of the course, student will be able to:

- CO 1. Classify engineering materials.
- CO 2. Analyze the characteristics of conducting, dielectric and insulating materials.
- CO 3. Analyze the characteristics of semi-conducting materials.
- CO 4. Describe the energy level for semiconductor materials.
- CO 5. Describe nano-materials with their applications.

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B.Tech. II 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	
	DC	Digital Circuits & Systems	60	20	20	60	20	20	200	3	-	2	4

Digital Circuits & Systems ()

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:

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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B.Tech. II Semester (Electronics Engineering/Electronics & 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	
	DC	Electronic circuit	60	20	20	60	20	20	200	2	1	2	4

Electronic Circuit ()

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

Signals & Systems ()

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.