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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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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			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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	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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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.