MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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

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		L	T	P	
140211	DC	Electronics Devices	60	20	20	60	40	200	2	1	2	4

Electronics Devices (140211)

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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140212	DC	Engineering materials	60	20	20	-	-	100	3	1	-	4

Engineering Materials (140212)

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

Unit 1 Conducting materials: Classification of Engineering Materials, Crystal Structure of The Material, Crystal System, Unit Cells and Space Lattices and Defects. Conducting Material- Properties of Conductors, Characteristics of Good Conductor Material, Commonly used Conducting Materials, Conducting Materials for Overhead Lines, Types of Conductor and Applications.

Unit 2 Dielectric materials: Dielectric Strength, Factors affecting Dielectric Strength, Dielectric Loss, Dissipation Factor, Factors affecting Dielectric Loss, Permittivity & Polarization, Conduction through Dielectric. Application of Dielectric. Different Types of Capacitors and Materials used for them. Piezoelectricity & Ferro Electricity

Unit 3 Semi Conducting Material: Introduction - Semi-conductors and their properties, Different Semiconducting materials (Silicon and Germanium) used in manufacture of various Semiconductor devices (i.e p-type and n-type semiconductors), Materials used for electronic components like Resistors, Capacitors, Diodes, Transistors and Inductors etc.

Unit 4 Insulating Material: Plastics- Definition and classification, Thermosetting Materials, Thermoplastic Materials; Natural Insulating materials, properties and their applications; Gaseous Materials – Ceramics-properties and applications.

Unit 5 Magnetic Material: Introduction and classification - Ferromagnetic Materials, Permeability, BH curve, Magnetic Saturation, Hysteresis loop (including) coercive force and Residual Magnetism, Concept of Eddy Current and Hysteresis loss, Curie temperature, Magnetostriction effect, Soft Magnetic Materials, Hard Magnetic materials , Hall effect and its applications.

Text Books:

1. SK Bhattacharya, "Electrical and Electronic Engineering Materials"1st edition, Khanna Publishers, New Delhi, 2006.
2. A.J. Dekker "Electrical Engineering Materials", Reprint 1st edition, PHI, 2006.

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.

Course Outcome:

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

CO 1. Classify engineering materials.
CO 2. Analyze the characteristics of dielectric materials.
CO 3. Analyze the characteristics of semi-conducting materials.
CO 4. Identify insulating materials for special purposes.
CO 5. Classify magnetic materials with reference to their properties.