



Third Year B. Tech (Sixth Semester)			
Open Elective: BEEEX12: Electrical Materials			
Teaching Scheme		Examination Scheme	
Lectures	4 Hr / Week	ESE	60 Marks
Tutorial	-	CIE	40 Marks
Practical	-	Total	100 Marks
Theory Credits: 4		Duration of Exam: 3 Hours	
Course Objectives			
The Objectives of this course is:			
1.	To acquire the knowledge on general properties of different conductors		
2.	To learn the fundamental properties of dielectric materials & high resistivity materials		
3.	To gain the knowledge of different insulating materials.		
Course Contents			
Unit I	Conducting Materials: Introduction of Classification of material into conducting, semi conducting and insulating materials, Resistance and factors affecting it such as alloying and temperature, Classification of conducting material as low resistivity and high resistivity materials, their practical applications, Super conductivity materials		
Unit II	Semi- Conducting Materials: 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 III	Insulating Materials: General Properties: Electrical Properties - Volume resistivity, surface resistance, dielectric loss, dielectric strength (breakdown voltage) dielectric constant, Physical Properties - Hygroscopicity, tensile and compressive strength, abrasive resistance, brittleness Thermal Properties- Heat resistance, classification according to permissible temperature rise. Effect of overloading on the life of an electrical appliance, increase in rating with the use of insulating materials having higher thermal stability, Thermal conductivity, Electrothermal breakdown in solid dielectrics, Chemical Properties - Solubility, chemical resistance, weather ability, Mechanical properties – mechanical structure, tensile structure IS Standards		
Unit IV	Insulating Materials and Their Applications: Plastics Definition and classification, thermosetting materials, Thermoplastic materials; Natural insulating materials, properties and their applications; Gaseous materials – Ceramics-properties and applications.		
Unit V	Magnetic Materials and Special Materials: Introduction, classification - ferromagnetic materials, permeability, BH curve, magnetic saturation, hysteresis		



Department of Electrical Engineering (NBA Accredited)

	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. Thermocouple, bimetals, leads soldering and fuses Material - their applications. Magnetization, Demagnetizations, nano materials
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Text Books

T.1	A.J. Dekker “Electrical Engineering Materials”, PHI, 2 nd Edition
T.2	Dr. C.S. Indulkar, Dr. S. Thiruvengadam “Introduction to Electrical Engineering Materials” S. Chand Publications
T.3	SK Bhattacharya, “Electrical and Electronic Engineering Materials” 1 st edition Khanna Publishers

Reference Books

R.1	Sahdev, “Electrical Engineering Materials”, Unique International Publications
R.2	S.P. Seth, P.V. Gupta “A course in Electrical Engineering Materials”

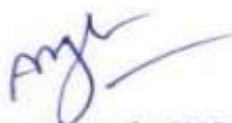
Useful Links

1	https://www.youtube.com/watch?v=m9I1tVXyFp8
2	https://www.youtube.com/watch?v=XaId7WR0mGo

	Course Outcomes	CL
BEEEX12.1	Analyse the types & characteristics of conducting materials	4
BEEEX12.2	Utilize the properties and types of semiconducting materials in electrical engineering applications	4
BEEEX12.3	Differentiate general and thermal properties of insulating materials	4
BEEEX12.4	Know the classification and application of insulating materials	2
BEEEX12.5	Implement a suitable selection criterion of a material for manufacturing of electrical equipment's	3


HOD

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