Lesson Plan

Name of the Faculty : Mandeep Singh
Discipline : Electrical Engineering
Semester : 3rd
Subject : Electrical and Electronics Engineering Materials (EEEM)
Lesson Plan duration : 15 weeks (07.09.2020 to 24.12.2020)
Work load per week : Lecture-04 and Practical-00

Week	Theory	
	Lecture day	**Topic** (including Assignments and Test)
1st	1	Subject introduction and overview
	2	**Unit-1 Classification:** Modern Atomic Theory, Atomic Structure, Energy Band Theory
	3	Classification of materials according to their atomic structure and Energy Band Theory.
	4	Revision of unit -1
2nd	5	**Unit-2 Conducting Materials:** Introduction, Resistance and factor affecting it such as allowing, temperature etc.
	6	Classification of Conducting material as Low resistivity and High Resistivity materials
	7	Low Resistivity Material: Copper: General Properties such as resistivity, temperature coefficient etc., Mechanical Properties, Hard Drawn and Annealed Copper, Application in Electrical field.
	8	Aluminium: General Properties, Mechanical Properties and Applications in Electrical field.
3rd	9	Steel: Mechanical Properties and applications in the field of Electrical Engineering
	10	Introduction to Bundle Conductors and its application
	11	Low Resistivity Copper alloys such as Brass, Bronze and their practical application.
	12	Special metals such as Silver, Gold, Platinum and their application.
4th	13	High Resistivity material: Manganin, Constantan, Nichrome and their application.
	14	Mercury, Carbon, Tungsten: Properties and applications
	15	Superconductors and their applications.
	16	Revision and Assignment
5th	17	**Unit-3: Review of Semiconducting Materials:** Semiconductor and their properties
	18	Material used for electronic components like resistors, capacitors, diodes, transistors, inductors etc.
	19	Revision
	20	1st Sessional test (tentative)
	21	**Unit:4 Insulating Materials:** Overview and General Properties
	22	Electrical Properties: Volume resistivity, surface resistance, dielectric loss, dielectric constant.

6th	23	Physical Properties: Hygroscopicity, tensile and compressive strength, abrasive resistance, brittleness.
	24	Thermal Properties: Heat Resistance, Thermal Conductivity, Electro-thermal breakdown in solid dielectrics.
7th	25	Classification of Insulating materials according to permissible temperature rise
	26	Effect of overloading on the life of an electrical appliance, increase in rating with the use of insulating materials having higher thermal stability.
	27	Chemical Properties: Solubility, Chemical resistance, weatherability.
	28	Mechanical Properties: Mechanical structure, tensile structure etc.
8th	29	Revision
	30	**Unit-5 Insulating Materials and their applications:** Plastics: Definition and their classification
	31	Thermosetting Materials: Phenyl-formaldehyde resins (i.e. Bakelite), amino resins, epoxy resins – their important properties and applications.
	32	Thermo-plastic materials: PVC, Polyethylene, Silicones – their properties and application.
9th	33	Natural Insulating Materials: Mica and Mica Products: Properties and their applications.
	34	Asbestos and Asbestos Products: Properties and their applications.
	35	Ceramic materials: Types (Porcelain and steatite), properties and applications.
	36	Glass and Glass products: Properties and applications.
10th	37	Cotton, Silk and Jute: Properties and their applications.
	38	Paper (Dry and Impregnated), Rubber, Bitumen: Properties and their applications
	39	Mineral and Insulating Oil for transformers, switchgear capacitors, high voltage insulated cables, insulating varnishes for coating and impregnation.
	40	Enamels for winding wires, Glass fiber sleeves
11th	41	Gaseous Insulating materials: Air, Hydrogen, Nitrogen- their properties and application.
	42	SF_6 – Properties and Application.
	43	Revision and Assignment
	44	2nd Sessional Test (Tentative)
12th	45	**Unit-6 Magnetic Materials:** Introduction, Ferromagnetic materials, permeability, magnetic saturation.
	46	B-H Curve, Hysteresis loop including coercive force and residual magnetism
	47	Concept of eddy current and hysteresis loss, curie temperature, magnetostriction effect.
	48	Soft Magnetic Materials: Alloyed steels with silicon: High silicon alloy steel for transformers, Low silicon alloy steel for electric rotating machines.
13th	49	Cold rolled grain-oriented steels for transformer, Non-oriented steels for rotating machine.
	50	Nickel- iron alloys, Soft Ferrites
	51	Hard magnetic materials: Tungsten steel, Chrome steel and their applications.
	52	Hard ferrites, cobalt steel and their applications

14th	53	Revision of chapter-6
	54	**Unit-7 Special Materials:** Thermocouple, Bimetals and their applications
	55	soldering and fusing materials and their applications.
	56	**Unit-8 Introduction of various engineering materials necessary for fabrication of electrical machines:** Introduction and Overview
15th	57	Continue – Material necessary for fabrication of Electrical Machines such as motor, generator, transformers etc.
	58	Revision and Assignment
	59	3rd Sessional Test
	60	Complete Revision