LESSON PLAN

NAME OF FACULTY: SH. HITESH AGGARWAL
DISCIPLINE: MECHANICAL ENGINEERING
SEMESTER: IV
SUBJECT: MATERIAL AND METALLURGY
LESSON PLAN DURATION: 15 WEEKS

WORK LOAD (LECTURE/PRACTICAL) PER WEEK: THEORY- (3 PERIODS/ 2PERIODS)

WEEK	THEORY		PRACTICALS
	LECTURE NO.	TOPIC	TOPIC
1st	1	**1. Introduction** Material, History of Material Origin, Scope of Material Science.	1. Classification of about 25 specimens of materials/machine parts Into (i) Metals and non Metals (ii) Metals and alloys (iii) Ferrous and non ferrous metals (iv) Ferrous and non ferrous alloys
	2	Overview of different engineering materials and applications.	
	3	Classification of materials, Thermal, Chemical and Electrical properties of various materials.	
2nd	4	Mechanical properties of various materials, Present and future needs of materials.	2. Given a set of specimen of metals and alloys (copper, brass, aluminum, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them.
	5	Overview of Biomaterials and semi- conducting materials.	
	6	Various issues of Material Usage-Economical, Environment and Social.	
3rd	7	**2.Crystallography** Fundamentals of Crystal, Unit Cell, Space Lattice,	Copy Checking/revision
	8	Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals,	
	9	Number of atoms per unit Cell, Atomic Packing Factor	
4th	10	Deformation: Overview of deformation behavior and its mechanisms,	3. Study of heat treatment furnace.
	11	Behavior of material under load and stress-strain.	
	12	Failure Mechanisms: Overview of failure modes, fracture, fatigue and creep.	
5th	13	**SESSIONAL TEST-I**	4. Study of a Metallurgical microscope and a specimen polishing
	14	**3. Metals And Alloys** Introduction: History and development of iron and steel.	

	15	Different iron ores, Raw Materials in Production of Iron and Steel.	machine.
6th	**16**	Basic Process of iron-making and steel-making,	Copy Checking/revision
	17	Classification of iron and steel.	
	18	Cast Iron: Different types of Cast Iron manufacture and their usage.	
7th	**19**	Steels: Steels and alloy steel,	5. To prepare specimens of following materials for Microscopic examination and to Examine the microstructure of the specimens of following materials: i) Brass ii)Copper iii)Grey iv)Malleable v)Low carbon steel vi)High carbon steel vii) HSS
	20	Classification of plain carbon steels,	
	21	Availability, Properties and usage of different types of Plain Carbon Steels,	
8th	**22**	Effect of various alloys on properties of steel,	6. To anneal a given specimen and find out difference in hardness as a result of annealing.
	23	alloy steels (high speed steel, stainless steel,	
	24	Uses of spring steel, silicon steel	
9th	**25**	Non Ferrous Materials: Properties and uses o Light Metals and their alloys,	Copy Checking/revision
	26	properties and uses of White Metals and their alloys.	
	27	**4. Theory of Heat Treatment** Purpose of heat treatment,	
10th	**28**	Solid solutions and its types,	7. To normalize a given specimen and to find out the difference in hardness as a result of normalizing.
	29	Iron Carbon diagram,	
	30	Formation and decomposition of Austenite, Martensitic Transformation – Simplified Transformation Cooling Curves	
11th	**31**	**SESSIONAL TEST-II**	8. To harden and temper a specimen and to find out the difference in hardness due to tempering.
	32	various heat treatment processes- hardening, tempering, annealing, normalizing, Case hardening and surface hardening	
	33	Types of heat treatment furnaces required for above operations (only basic idea)	
	34	**5. Engineering Plastics** Important sources of plastics,	Copy Checking/revision

12th	35	Classification-thermoplastic and thermo set and their uses.	
	36	Various Trade names of Engg. Plastics, Plastic Coatings.	
13th	37	**6. Advanced Materials**	Copy Checking/revision
		Composites-Classification, properties, applications	
	38	Ceramics-Classification, properties.	
	39	applications Heat insulating materials	
14th	40	**7. Miscellaneous Materials** Asbestos, Glass wool,	Viva-voice
	41	Properties and uses of thermocole, cork, mica.	
	42	Overview of tool and die materials,	
15th	43	Materials for bearing metals, Spring materials,	Viva-voice
	44	Materials for Nuclear Energy, Refractory materials.	
	45	**SESSIONAL TEST-III**	