

Lesson Plan

Name of Faculty : Pawan Kumar, Associate Professor
Discipline : Mechanical Engg.
Semester : 4th
Subject : Material Science and Material Science lab

Week	Theory		Practical	
	Lecture Day	Topic (Including Assignment/Test)	Practical Day	Topic
Unit-I : Crystallography & Imperfection in metal crystals				
1 st	1	Crystallography: Review of crystal structure, space lattice	1	To study crystal structures of a given specimen.
	2	Crystal planes and crystal directions, co-ordination number		
	3	Number of atoms per unit cell, atomic packing factor		
2 nd	4	Crystal imperfections and their classifications	2	To study crystal imperfections in a given specimen.
	5	Point defects, line defects, Edge & screw dislocations, surface defects		
	6	Volume defects & effects of imperfections on metal properties		
Unit-II : Solid solutions and phase diagram & Heat Treatment				
3 th	7	Solid solutions and phase diagram: Introduction to single and multiphase solid solutions and types of solid solutions	3	To study microstructures of metals/ alloys .
	8	Importance and objectives of phase diagram, Systems, phase and structural constituents		
	9	Cooling curves, unary & binary phase diagrams		
4 th	10	Gibbs's phase rule, Lever rule	4	To prepare solidification curve for a given specimen
	11	Eutectic and eutectoid systems, peritectic and peritectoid systems		
	12	Iron carbon equilibrium diagram and TTT diagram. Heat Treatment: Principles, purpose		
5 th	13	Classification of heat treatment processes	5	To study heat treatment processes (hardening and tempering) of steel specimen .
	14	Annealing, normalizing, stress relieving		
	15	Hardening, tempering, carburizing, Nitriding, cyaniding, flame and induction hardening		
6 th	16	Allotropic transformation of iron and steel.	6	To study microstructure of heat-treated steel
	17	Properties of austenite, ferrite, pearlite, martensite		
	18	Assignment-I		
7 th	1 st Minor Test			
Unit- :III Deformation of Metal & Failures of metals				
8 th	19	Deformation of Metal: Elastic and plastic deformation, Mechanism of plastic deformation	7	To study the properties of various types of plastics
	20	Twinning, conventional and true stress strain curves for polycrystalline materials		
	21	Yield point phenomena, strain ageing		
9 th	22	Work hardening, Bauschinger effect	8	Internal Vivo-Vice-1
	23	Season cracking. Recovery, re-crystallization and grain growth		
	24	Failures of metals: Failure analysis, Fracture, process of fracture		
10 th	25	Types of fracture, fatigue, characteristics of fatigue,	9	To study the mechanism of chemical corrosion and its protection
	26	Fatigue limit, mechanism of fatigue		
	27	Factors affecting fatigue		
Unit- :IV Creep & Corrosion & Plastic, Composite and Ceramics				
	28	Creep & Corrosion: Definition and		To study the creep behavior of a

11 th		concept, Creep curve, mechanism of creep	10	given specimen
	30	Impact of time and temperature on creep, creep fracture		
	31	Creep testing and prevention against creep		
12 th	32	Corrosion: Mechanism and effect of corrosion, Prevention of corrosion	11	To study thermo-setting of plastics.
	33	Plastic, Composite and Ceramics: Polymers		
	34	Formation of polymers, polymer structure and crystallinity		
13 th	35	Polymers to plastics types, reinforced particles-strengthened and dispersion strengthened composites	12	Internal Vivo-Vice-2
	36	Ceramic materials: Types of ceramics, properties of ceramic, ceramic forming techniques, Mechanical behavior of ceramic		
	37	Assignment-II		
14 th	2 nd Minor Test			

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