

Discipline : Mechanical Engg.		Semester: 3rd Sem	Name of the Teaching Faculty : Shiba Kumar Patra		
SUBJECT- Material Science and Engineering		No. of Days / per week class allotted : 04	Semester From date : 15.07.2026 To Date : 05.11.2026		
MONTH	Week	Day	Topics		
JULY	3RD	3RD	Crystal structures and Bonds: Unit cell and space lattice: Crystal system: The seven basic crystal systems		
		5TH	Crystal structure for metallic elements: BCC, FCC and HCP		
	4TH	1ST	Coordination number for Simple Cubic, BCC and FCC		
		3RD	Atomic radius: definition, atomic radius for Simple Cubic, BCC and FCC		
		5TH	Atomic Packing Factor for Simple Cubic, BCC, FCC and HCP		
	5TH	1ST	Simple problems on finding number of atoms for a unit cell		
		3RD	Bonds in solids: Classification - primary or chemical bond, secondary or molecular bond		
		5TH	Types of primary bonds: Ionic, Covalent and Metallic Bonds		
	AUGUST	2ND	1ST	Types of secondary bonds: Dispersion bond, Dipole bond and Hydrogen bond	
			3RD	Phase diagrams, Ferrous metals and its Alloys: Isomorphs, eutectic and eutectoid systems	
5TH			Iron-Carbon binary diagram		
3RD		1ST	Iron and Carbon Steels; flow sheet for production of iron and steel		
		3RD	Iron ores – Pig iron: classification, composition and effects of impurities on iron		
		5TH	Cast Iron: classification, composition, properties and uses		
4TH		1ST	Wrought Iron: properties, uses/applications of wrought Iron		
		3RD	comparison of cast iron, wrought iron and mild steel and high carbon steel		
		5TH	standard commercial grades of steel as per BIS and AISI		
5TH		1ST	Alloy Steels – purpose of alloying; effects of alloying elements		
	5TH	Important alloysteels: Silicon steel, High Speed Steel (HSS), heat resisting Important alloysteels: Silicon steel, High Speed Steel (HSS), heat resisting steel, spring steel,Stainless Steel (SS)			
	6TH	1ST	Types of SS, applications of SS – magnet steel – composition, properties and uses		
SEPTEMBER	1ST	3RD	Non-ferrous metals and its Alloys: Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel		
	2ND	1ST	Copper alloys: Brasses, bronzes – composition, properties and uses		
		3RD	Aluminum alloys: Duralumin, hinalium, magnelium – composition, properties and uses		
		5TH	Nickel alloys: Inconel, monel, nicPerome –composition, properties and uses		
	3RD	5TH	Anti-friction/Bearing alloys: Various types of bearing bronzes - Standard commercial grades as per BIS/ASME		
	4TH	1ST	Failure analysis & Testing of Materials: Introduction to failure analysis; Fracture: ductile fracture, brittle fracture; cleavage; notch sensitivity; fatigue; endurance limit		
		3RD	characteristics of fatigue fracture; variables affecting fatigue life; creep; creep curve; creep fracture		
		5TH	Destructive testing: Tensile testing; compression testing; Hardness testing: Brinell, Rockwell; bend test; torsion test; fatigue test; creep test		
		1ST	Non- destructive testing: Visual Inspection; magnetic particle inspection; liquid penetrant test; ultrasonic inspection; radiography		

OCTOBER	5TH	3RD	Corrosion & Surface Engineering: Nature of corrosion and its causes; Electro chemical re-actions; Electrolytes; Factors affecting corrosion: Environment, Material properties and physical conditions
	2ND	1ST	Types of corrosion; Corrosion control: Material selection, environment control and design
		3RD	Surface engineering processes: Coatings and surface treatments
		5TH	Cleaning and mechanical finishing of surfaces
	3RD	1ST	Organic coatings; Electroplating and Special metallic plating
		3RD	Electro polishing and photo- etching
		5TH	Conversion coatings. Oxide, phosphate and chromate coatings
	4TH	3RD	Thin film coatings
		5TH	PVD and CVD
	5TH	1ST	Surface analysis; Hard-facing
		3RD	thermal spraying and high- energy processes
		5TH	Process/material selection
NOVEMBER	1ST	1ST	Pollution norms for treating effluents as per standards.
		3RD	Revision

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