

C. V. RAMAN POLYTECHNIC, BHUBANESWAR

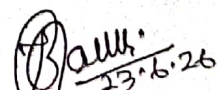
LESSON PLAN Session (2026-2027)

Discipline: Mechanical Engineering	Semester: 3 rd Semester, Winter/2026	Name of the Faculty: Dr. Brundaban Sahoo, Asst.Prof Email ID: brundaban.sahoo@cvrp.edu.in
Subject: Material Science and Engineering , Theory-3	No. of Days/week: 03	Start Date: 01/07/2026 End Date: 05/11/2026

Week	Class Day	Theory Topics
1st	1st	Crystal structures: Unit cell and space lattice; The seven basic crystal systems.
	2nd	Crystal structure for metallic elements: BCC, FCC and HCP.
	3rd	Coordination number for Simple Cubic, BCC and FCC.
2nd	1st	Atomic radius: definition, atomic radius for Simple Cubic, BCC and FCC.
	2nd	Atomic Packing Factor for Simple Cubic, BCC, FCC.
	3rd	Atomic Packing Factor for HCP.
3rd	1st	Simple problems on finding number of atoms for a unit cell.
	2nd	Bonds in solids: Classification - primary or chemical bond, secondary or molecular bond.
	3rd	Types of primary bonds: Ionic, Covalent and Metallic Bonds.
4th	1st	Types of secondary bonds: Dispersion bond, Dipole bond and Hydrogen bond.
	2nd	Phase diagrams: Isomorphs, eutectic and eutectoid systems.
	3rd	Iron-Carbon binary diagram.
5th	1st	Iron and Carbon Steels; flow sheet for production of iron and steel.
	2nd	Cast Iron: classification, composition, properties and uses.
	3rd	Wrought Iron: properties, uses/applications; comparison of cast iron, wrought iron, mild steel and high carbon steel.
6th	1st	Standard commercial grades of steel as per BIS and AISI.
	2nd	Alloy Steels – purpose of alloying; effects of alloying elements.
	3rd	Important alloy steels: Silicon steel, High Speed Steel (HSS), heat resisting steel, spring steel.

7th	1st	Stainless Steel (SS): types, applications; magnet steel – composition, properties and uses.
	2nd	Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel.
	3rd	Copper alloys: Brasses – composition, properties and uses.
8th	1st	Copper alloys: Bronzes – composition, properties and uses.
	2nd	Aluminum alloys: Duralumin, hinalium – composition, properties and uses.
	3rd	Aluminum alloys: Magnesium – composition, properties and uses.
9th	1st	Nickel alloys: Inconel, monel – composition, properties and uses.
	2nd	Nickel alloys: Nichrome – composition, properties and uses.
	3rd	Anti-friction/Bearing alloys: Various types of bearing bronzes.
10th	1st	Standard commercial grades of bearing alloys as per BIS/ASME.
	2nd	Introduction to failure analysis; Fracture: ductile fracture, brittle fracture; cleavage.
	3rd	Notch sensitivity; fatigue; endurance limit; characteristics of fatigue fracture.
11th	1st	Variables affecting fatigue life; creep; creep curve; creep fracture.
	2nd	Destructive testing: Tensile testing; compression testing.
	3rd	Hardness testing: Brinell, Rockwell; bend test; torsion test.
12th	1st	Fatigue test; creep test.
	2nd	Non-destructive testing: Visual Inspection; magnetic particle inspection.
	3rd	Liquid penetrant test; ultrasonic inspection.
13th	1st	Radiography testing.
	2nd	Nature of corrosion and its causes; Electro chemical reactions; Electrolytes.
	3rd	Factors affecting corrosion; Types of corrosion; Corrosion control.
14th	1st	Surface engineering processes: Coatings, surface treatments, cleaning, mechanical finishing.
	2nd	Organic coatings; Electroplating and Special metallic plating.
	3rd	Electro polishing and photo-etching; Conversion coatings: Oxide, phosphate and chromate.
15th	1st	Thin film coatings: PVD and CVD; Surface analysis.
	2nd	Hard-facing, thermal spraying and high-energy processes.
	3rd	Process/material selection; Pollution norms for treating effluents as per standards.


Signature of Faculty


Signature of HOD