

GOVERNMENT POLYTECHNIC JAJPUR At/ Po: Ragadi, Block: Korei, Dist.: Jajpur, Odisha- 755019 Website: https://www.gpjajpur.org E-mail: principalgpjajpur@yahoo.co.in Contact: 9437155107		
DEPARTMENT OF MECHANICAL ENGG.		
LESSON PLAN (2026-27)		
Discipline: MECHANICAL	SEMESTER:3rd	Name of the Teaching faculty: SUSHANTA KUMAR MOHANTA
SUBJECT: MSE (TH3)	No of Days/Week class allotted: 3	Semester starts from Date: 01/07/2026 To 05/11/2026 No of weeks: 15
1st	1st	UNIT :I Crystal structures and Bonds: Unit cell and space lattice: Crystal system: The seven basic crystal systems;
	2nd	Crystal structure for metallic elements: BCC, FCC and HCP
	3rd	Coordination number for Simple Cubic, BCC and FCC; Atomic radius: definition, atomic radius
2nd	1st	atomic radius for Simple Cubic, BCC and FCC
	2nd	Atomic Packing Factor for Simple Cubic, BCC, FCC and HCP
	3rd	Simple problems on finding number of atoms for a unit cell
3rd	1st	Bonds in solids: Classification - primary or chemical bond, secondary or molecular bond; Types of primary bonds: Ionic, Covalent and Metallic Bonds
	2nd	Types of secondary bonds: Dispersion bond, Dipole bond and Hydrogen bond
	3rd	Unit-II: Phase diagrams, Ferrous metals and its Alloys: Isomorphs, eutectic and eutectoid systems
4th	1st	Iron-Carbon binary diagram;
	2nd	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	1st	Cast Iron: classification, composition, properties and uses comparison of cast iron, wrought iron and mild steel and high carbon steel;
	2nd	comparison of cast iron, wrought iron and mild steel and high carbon steel;
	3rd	standard commercial grades of steel as per BIS and AISI; Alloy Steels – purpose of alloying; effects of alloying elements
6th	1st	Important alloysteels: Silicon steel, High Speed Steel (HSS), heat resisting steel, spring steel
	2nd	Stainless Steel (SS): types of SS, applications of SS – magnet steel – composition, properties and use Non-ferrous metals and its Alloys
	3rd	Unit-III Non-ferrous metals and its Alloys Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel

7th	1st	Copper alloys: Brasses, bronzes – composition, properties and uses;
	2nd	Aluminum alloys: Duralumin, hinalium, magnelium
	3rd	composition, properties and use
8th	1st	Nickel alloys: Inconel, monel, nicPerome
	2nd	composition, properties and uses.
	3rd	Anti-friction/Bearing alloys: Various types of bearing bronzes
9th	1st	Standard commercial grades as per BIS/ASME
	2nd	Standard commercial grades as per BIS/ASME
	3rd	UNIT-IV Failure analysis & Testing of Materials: Introduction to failure analysis; Fracture: ductile fracture
10th	1st	brittle fracture; cleavage; notch sensitivity; fatigue; endurance limit;
	2nd	characteristics of fatigue fracture; variables affecting fatigue life;
	3rd	creep; creep curve; creep fracture
11th	1st	Destructive testing: Tensile testing; compression testing; Hardness testing: Brinell, Rockwell;
	2nd	bend test; torsion test;
	3rd	fatigue test; creep test
12th	1st	Nondestructive testing: Visual Inspection; magnetic particle inspection
	2nd	liquid penetrant test; ultrasonic inspection
	3rd	radiography.
13th	1st	UNIT-V :Corrosion & Surface Engineering Nature of corrosion and its causes Electro chemical re-actions; Electrolyte
	2nd	Factors affecting corrosion: Environment, Material properties and physical conditions; Types of corrosion;
	3rd	Corrosion control: Material selection, environment control and design; Surface engineering processes
14th	1st	Coatings and surface treatments; Cleaning and mechanical finishing of surfaces; Organic coatings
	2nd	Electroplating and Special metallic plating; Electro polishing and photoetching ;– Conversion coatings:
	3rd	Oxide, phosphate and chromate coatings; Thin film coatings: PVD and CVD
15th	1st	Surface analysis; Hard-facing, thermal spraying and highenergy processes; Process/mate-rial selection
	2nd	Pollution norms for treating effluents as per standards.
	3rd	PREVIOUS YEAR QUESTION DISCUSSION

Sushanta Kumar Mohanta

Signature of faculty

REFERENCES:

1. Material Science –GBS Narang-Khanna Publishers, New Delhi
2. Material Science –R.K.Rajput –Lakshmi Publication , New Delhi
3. Material Science-R.S.Khurmi,R.S.Sedha-S.Chand,Publication
- 4.

4. Material Science and Metallurgy –D.S.Nutt-S.K,Katariya and Sons,New Delhi
5. Material Science and Engineering -V.Raghavan-EEE Edition,Prentice Hall ,New Delhi