

Lesson Plan

Subject : PHYSICAL METALLURGY (TH-2)

Name of faculty: SAGARIKA PALEI

Semester: 4th

Class allotted: 3p/week

Branch: Metallurgical Engg. Session: 2026(S)

Discipline	Semester	From date: 22/12/2025 To date: 18/04/2026	Teaching Aid
Subject:	No. of days/ per week	Theory/ Practical – Topics/Lesson	
Week	Date/Period		
1	22/12/2025 TO 27/12/2025	Basic Concepts of Physical Metallurgy Introduction to Metallurgy • Classification of materials: Metals, alloys, ceramics, polymers, composites	White Board Marker Smart board
2	29/12/2025 TO 03/01/2026	• Structure of metals: Atomic bonding, metallic bonding • Imperfections in Solids: Point defects: Vacancies, interstitials, substitutional defects,	White Board Marker Smart board
3	05/01/2026 TO 10/01/2026	Line defects: Edge and screw dislocations, Surface defects: Grain boundaries, twin boundaries and volume defects	White Board Marker Smart board
4	12/01/2026 TO 17/01/2026	Solid Solutions & Solidification of pure metals & alloys: Solid Solutions: Solid solutions (substitutional, interstitial), Hume-Rothery rules,	White Board Marker Smart board
5	19/01/2026 TO 24/01/2026	Intermediate phases, Solidification of pure metals & alloys : Alloys and solid solution,	White Board Marker Smart board

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6	27/01/2026 TO 31/01/2026	solidification and crystallization, role of free energy thermodynamic potential in conversion of liquid to solid	White Board Marker Smart board
7	02/02/2026 TO 07/02/2026	, super cooling, under cooling, degree of super cooling, mechanism of solidification/crystallization, nucleation, critical size nucleus,.	White Board Marker Smart board
8	09/02/2026 TO 14/02/2026	spontaneous nucleation, relation between nucleation and grain growth, shape of crystals and solidification of ingot	White Board Marker Smart board
9	16/02/2026 TO 21/02/2026	Phase Diagrams & Phase Transformations: Phase Rule: Definitions of phase, component, degree of freedom	White Board Marker Smart board
10	23/02/2026 TO 28/02/2026	, the phase rule and its applications. Unary Phase Diagrams: Pressure-temperature diagrams for pure substances	Marker White Board Smart board
11	02/03/2026 TO 07/03/2026	. Binary Phase Diagrams: Interpretation of binary phase diagrams (eutectic, peritectic, eutectoid, peritectoid), lever rule, equilibrium and non-equilibrium cooling.	White Board Marker Smart board
12	09/03/2026 TO 14/03/2026	Iron carbon diagram.	Marker White Board Smart board
13	16/03/2026 TO 18/03/2026	Alloys and Their Properties (10 hours) Ferrous Alloys: • Plain Carbon Steels: Classification based on carbon content, their properties and applications. • Alloy Steels: Effects of alloying elements (Ni, Cr, Mo, V, W, Mn, Si) on properties, classification of alloy steels, applications, stainless and special steels • Cast Irons: Types of cast irons (grey, white, ductile, malleable), their microstructure, properties, and applications. Non-Ferrous Alloys: • Aluminum Alloys: Common aluminum alloys, their properties, and applications.	White Board Marker Smart board


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14	23/03/2026 TO 28/03/2026	<p>Alloys and Their Properties:</p> <p>Ferrous Alloys:</p> <ul style="list-style-type: none"> Plain Carbon Steels: Classification based on carbon content, their properties and applications. Alloy Steels: Effects of alloying elements (Ni, Cr, Mo, V, W, Mn, Si) on properties, classification of alloy steels, applications, stainless and special steels 	White Board Marker Smart board
15	30/03/2026 TO 04/03/2026	<ul style="list-style-type: none"> Cast Irons: Types of cast irons (grey, white, ductile, malleable), their microstructure, properties, and applications. Non-Ferrous Alloys: Aluminum Alloys: Common aluminum alloys, their properties, and applications Copper Alloys: Brass, bronze, cupronickel, their properties, and applications 	White Board Marker Smart board
16	06/04/2026 TO 11/04/2026	<ul style="list-style-type: none"> Other Non-Ferrous Alloys: Brief overview of titanium alloys, nickel alloys, etc. Superalloys, shape memory alloys – classification, properties and applications 	White Board Marker Smart board
17	13/04/2026 TO 18/04/2026		White Board Marker Smart board

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