

LESSON PLAN FOR ACADEMIC SESSION: 2026-2027(winter)

Discipline: Metallurgical Engineering	Semester : 5th	Name of teaching faculty: Rueigved mahanand
subject: HEAT TREATMENT	No. Of days/week class allotted : 03	Semseter From: 01/07/2026 to 05/11/2026
week	Class Day	Theory topics
1 st	1 st	Definition, Objectives, and Industrial Applications of Heat Treatment
	2 nd	Phase Diagrams with Emphasis on the Iron-Carbon System
	3 rd	Critical Temperatures (A1, A3, Acm) and Their Metallurgical Significance
2 nd	1 st	Phase Transformations: Diffusion, introduction to diffusion, fick"s law
	2 nd	The formation of austenite, the mechanism of formation" of austenite,
	3 rd	austenitic grain size.the methods of determination of austenitic grain size,
3 rd	1 st	the importance of grain size,
	2 nd	the method of measurement of grain size
	3 rd	the methods of control austenitic grain size
4 th	1 st	decomposition of austenite and pearlitic transformationThe process of construction of T-T-T diagram and CCT diagram,
	2 nd	the TTT & CCT Diagram for hypo eutectoid,
	3 rd	the TTT & CCT Diagram for eutectoid and hyper eutectoid stee
5 th	1 st	bainitic transformation,
	2 nd	martensitic transformation
	3 rd	Annealing: Full, Process, Stress-Relief, and Spheroidizing, Temperature range
6th	1 st	Normalizing: Objectives and Microstructural Changes, Temperature range
	2 nd	Hardening: Objectives and Microstructural Changes, Temperature range, factors affecting hardening process, Quenching Media
	3 rd	Hardening: Objectives and Microstructural Changes, Temperature range, factors affecting hardening process, Quenching Media
7th	1 st	Tempering: Purpose, Mechanisms, and Effects of Tempering Temperature
	2 nd	Thermomechanical Processing (TMP): Principles and Applications

	3 rd	Special Processes: Austempering, Martempering, Cryogenic Treatment
8th	1 st	Heat Treatment of Non-Ferrous Alloys (Aluminum, Copper, Titanium Alloys)
	2 nd	Heat Treatment of Non-Ferrous Alloys (Aluminum, Copper, Titanium Alloys)
	3 rd	Importance of hardness & hardenability
9th	1 st	the method of determination of hardenability (Gross Man's critical diameter method & Jominey end quench method)
	2 nd	the factors affecting hardenability,
	3 rd	effect of austenitic grain size, carbon content, and alloying elements.
10 th	1 st	effect of austenitic grain size, carbon content, and alloying elements.
	2 nd	Surface Hardening Techniques: Objectives of surface hardening, the methods of case depth measurement of steel
	3 rd	, carburizing : pack carburizing, liquid carburizing, gas carburizing
11 th	1 st	carburizing : pack carburizing, liquid carburizing, gas carburizing
	2 nd	Nitriding, Cyaniding, Carbonitriding
	3 rd	post carburizing heat treatment.
12 th	1 st	Advanced Techniques: Induction Hardening, Flame Hardening, Laser Hardening
	2 nd	Heat Treatment Furnaces: Box, Pit, Salt Bath, and Vacuum Furnaces
	3 rd	Furnace Atmospheres: Neutral, Carburizing, and Nitriding Atmospheres
14 th	1 st	Heat Treatment Defects: Distortion, Cracking, Decarburization (Causes & Remedies)
	2 nd	Basic Idea, Consisting Elements, properties and real world application of Tool Steels, Stainless Steels (Austenitic (304, 316), Ferritic (430), Martensitic (410, 420), Duplex (2205),
	3 rd	High-Strength Low-Alloy (HSLA) Steels, Maraging Steels, Bearing Steels, Electrical Steels (Silicon Steels),
15 th	1 st	Creep- Resistant Steels (HeatResistant Steels), Duplex and Super Duplex Stainless Steels, Hadfield Manganese Steel (High-Mn Steel), TRIP and TWIP Steels (Advanced HighStrength Steels – AHSS)
	2 nd	Revision
	3 rd	Revision

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30/06/2026

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