

GOVERNMENT POLYTECHNIC JAIPUR

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DEPARTMENT OF METALLURGY

Discipline: Metallurgy	Semester: 5th	Name of the Teaching faculty: P ARADHANA
Subject: Heat treatment technology	No of Days/Week class allotted: 4	Semester from Date <u>1/7/26</u> To Date: <u>5/11/26</u> No of weeks: 15
Week	Class Day	Topics
1st	1 st	Definition, Objectives, and Industrial Applications of Heat Treatment
	2 nd	Iron-Carbon System, Critical Temperatures (A1, A3, Acm) and Their Metallurgical Significance
	3 rd	Iron-Carbon System, Critical Temperatures (A1, A3, Acm) and Their Metallurgical Significance
2nd	1 st	Phase Transformations: Diffusion, introduction to diffusion, Fick's law
	2 nd	The formation of austenite, determination of austenitic grain size, decomposition of austenite and pearlitic transformation.
	3 rd	The process of construction of T-T-T diagram
3rd	1 st	The process of construction of T-T-T diagram
	2 nd	CCT diagram
	3 rd	CCT diagram
4th	1 st	eutectoid and hyper eutectoid steel
	2 nd	bainitic transformation
	3 rd	martensitic transformation.
5th	1 st	Heat Treatment Processes for Ferrous: Annealing, Normalizing
	2 nd	Hardening, Tempering
	3 rd	Thermomechanical Processing (TMP)
6th	1 st	Austempering
	2 nd	Martempering
	3 rd	Cryogenic Treatment
7th	1 st	Heat Treatment of Non-Ferrous Alloys (Aluminum, Copper, Titanium Alloys)
	2 nd	Hardenability, Surface Hardening: hardenability
	3 rd	Gross Man's critical diameter method
8th	1 st	Jominey end quench method
	2 nd	factors affecting hardenability, effect of austenitic grain size, carbon content, and alloying elements.
	3 rd	Surface Hardening Techniques: Objectives of surface hardening, the methods of case depth measurement of steel
9th	1 st	carburizing : pack carburizing, liquid carburizing, gas carburizing
	2 nd	carburizing : pack carburizing, liquid carburizing, gas carburizing
	3 rd	Nitriding,
10th	1 st	Cyaniding
	2 nd	Carbonitriding
	3 rd	post carburizing heat treatment.

11th	1 st	Advanced Techniques: Induction Hardening, ,
	2 nd	Flame Hardening
	3 rd	Laser Hardening
12th	1 st	Heat Treatment Equipment: Heat Treatment Furnaces: Box, Pit, Salt Bath, and Vacuum Furnaces
	2 nd	Furnace Atmospheres: Neutral, Carburizing, and Nitriding Atmospheres
	3 rd	Heat Treatment Defects: Distortion, Cracking, Decarburization (Causes & Remedies)
13th	1 st	Heat Treatment Defects: Distortion, Cracking, Decarburization (Causes & Remedies)
	2 nd	Basic Idea, Consisting Elements, properties and real world application of Tool Steels
	3 rd	Stainless Steels (Austenitic (304, 316), Ferritic (430), Martensitic (410, 420)
14th	1 st	Duplex (2205), High-Strength Low-Alloy (HSLA) Steels, Maraging Steels,
	2 nd	Bearing Steels, Electrical Steels (Silicon Steels)
	3 rd	Creep- Resistant Steels (Heat-Resistant Steels), Duplex and Super Duplex Stainless Steels
15th	1 st	Hadfield Manganese Steel (High-Mn Steel), TRIP and TWIP Steels (Advanced High- Strength Steels – AHSS)
	2 nd	Revision
	3 rd	Revision

P. Pradha
lect. metallurgy