LESSON PLAN

Discipline: **Metallurgy Engineering**		Semester: **5th semester**	Name of the Teaching Faculty: **Miss Sitanjali Khuntia**
Subject: **HEAT TREATMENT TECHNOLOGY** Sub code: **Th.3**		No of days /week class allotted:**04/week**	Semester from Date: **01/08/2023 to 31/11/2023** No of weeks: **20**

Month	Week	No of periods available	Class Day	Theory topics to be covered
August	1st	03P	01-08-23	1.0 Introduction to heat treatment, Solid State Phase Transformation
			03-08-23	1.1 Give an introduction to diffusion, state fick's law.
			05-08-23	1.2 Discuss the formation of austenite, austenite grain growth on heating
	2nd	04P	07-08-23	1.3 Explain the mechanism of formation of austenite, austenitic grain size
			08-08-23	1.4 Discuss austenitic grain size.
			10-08-23	1.5 Explain the methods of determination of austenitic grain size.
			12-08-23	1.5 Explain the methods of determination of austenitic grain size
	3rd	03P	14-08-23	1.6 State the importance of grain size
			17-08-23	1.7 Explain the method of measurement of grain size. 1.8 Discuss the methods of control austenitic grain size
			19-08-23	1.9 Discuss decomposition of austenite and pearlitic transformation.
	4th	04P	21-08-23	1.10 Explain the process of construction of T-T-T diagram
			22-08-23	1.10 Explain the process of construction of T-T-T diagram
			24-08-23	1.11 Discuss the TTT Diagram for hypo eutectoid, eutectoid and hyper eutectoid steel, Applications of TTT diagram, limitations of TTT curve
			26-08-23	1.11 Discuss the TTT Diagram for hypo eutectoid, eutectoid and hyper eutectoid steel, Applications of TTT diagram, limitations of TTT curve
	5th	03P	28-08-23	1.11Construction of CCT diagram
			29-08-23	1.11Construction of CCT diagram
			31-08-23	1.11Construction of CCT diagram
September	6th	01P	02-09-23	1.12 Explain bainitic transformation. 1.13 Explain martensitic transformation.
	7th	04P	04-09-23	Revision
			05-09-23	

			07-09-23	2.0 Heat Treatment Process for Steels. 2.1 Discuss annealing
			09-09-23	2.1 Discuss annealing. 2.2 Explain stress relieving annealing
	8th	04P	11-09-23	2.3 Explain different types of annealing: homogenizing annealing, recrystallisation annealing, isothermal annealing, process annealing
			12-09-23	Monthly Test
			14-09-23	2.4 Explain the process of normalizing, comparison between annealing and normalization.
			16-09-23	2.5 Discuss the process of hardening. 2.6 Describe the factors affecting hardening process.
	9th	03P	18-09-23	2.7 Explain different methods of hardening. Process of quenching.
			21-09-23	2.8 Discuss quenching media and different types of quenchants: water, oil, brine, polymer quenchant, salt bath.
			23-09-23	2.9 Explain the tempering process for steel. 2.10 Discuss thermo-mechanical treatment of steel.
	10th	04P	25-09-23	2.11 Discuss martempering, austempering and subzero treatment.
			26-09-23	3.1 Define hardenability 3.2 Discuss the method of determination of hardenability (Gross Man's critical diameter method)
			28-09-23	3.2 Discuss the method of determination of hardenability (Jominey end quench method).
			30-09-23	3.3 Discuss the method of estimation of hardenability from chemical composition and fracture test
October	11th	03P	03-10-23	3.4 Discuss the factors affecting hardenability: effect of austenitic grain size, carbon content, and alloying elements.
			05-10-23	Revision
			07-10-23	
	12th	04P	09-10-23	Internal assessment/Class Test
			10-10-23	
			12-10-23	4 Surface Hardening Methods 4.1 Discuss high frequency induction hardening
			14-10-23	4.1 flame hardening, electron beam hardening, laser hardening.
	13th	03P	16-10-23	4.2 Discuss the methods of case depth measurement of steel.
			17-10-23	4.3 Explain different carburizing-processes of steel: pack carburizing.

		19-10-23	4.3 Explain different carburizing processes of steel: liquid carburizing, gas carburizing and vacuum carburizing.
14th	02P	26-10-23	4.4 Discuss the post carburizing heat treatment.
		28-10-23	4.5 Explain process of nitriding of steel.
15th	02P	30-10-23	Revision
		31-10-23	
16th	02P	02-11-23	4.6 Explain the process of cyaniding, carbo-nitriding of steel
		04-11-23	4.7 Explain the plasma nitriding.
17th	04P	06-11-23	4.8 Explain salt bath nitro carburizing
		07-11-23	4.9 Explain boronising, chromizing & Toyato diffusion process.
		09-11-23	5.0 Discuss the Heat Treatment of Non Ferrous Alloys: introduction
		11-11-23	5.1 Discuss Age Hardening or precipitation hardening of Al-Cu alloys, types of precipitates.
18th	04P	13-11-23	5.1 Discuss Age Hardening or precipitation hardening of Al-Cu alloys, types of precipitates.
		14-11-23	6.0 Alloy Steels
		16-11-23	6.1 Discuss different alloy steels- low alloy and high alloy steels.
		18-11-23	6.2 Discuss the effect of alloying elements on steel.
19th	04P	20-11-23	6.3 Discuss die steel, high speed steel
		21-11-23	6.3 Discuss high strength, low alloy steels, stainless steels.
		23-11-23	6.4 Discus the heat treatment of tool steel and stainless steel
		25-11-23	Revision & Doubt Clearing Class
20th	02P	28-11-23	
		30-11-23	

November

PREPARED BY
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01/08/2023

HOD
METALLURGY
ENGINEERING
OSME, KEONJHAR

8-8-23

PRINCIPAL
OSME, KEONJHAR