

LESSON PLAN FOR ACADEMIC SESSION: 2026-27 (WINTER)

Discipline: Metallurgical Engineering	Semester : 3rd	Name of the Teaching Faculty : Arpita Jena
Subject : Fuel Furnace and Refractories	No. of days / week class allotted : 03	Semester From : 20/7/2026 to 05/11/2026 Nos. of Weeks per semester : 15
Week	Class Day	Theory Topics
1 ST	1 st	Definition and classification of fuels (solid, liquid, and gaseous fuels)
	2 nd	Sources of fuel and their uses in industries, Calorific value: gross and net calorific value
	3 rd	Proximate and ultimate analysis of fuels ,Physical and chemical properties of fuels (moisture content, ash, sulfur, carbon content)
2 ND	1 st	Types of Fuels (Solid Fuels Liquid Fuels Gaseous Fuels
	2 nd	Origin of Coal, Coal&composition, and classification , coking properties and swelling index of coal
	3 rd	Carbonization of coal , Differentiate between H.T.C and L.T.C
3 RD	1 st	Test carried out for coke(Shatter and Micum index) ,Origin and constitution of petroleum
	2 nd	Discuss on flash point, fire point, cloud point, pour point, aniline point, octane number and cetane number .
	3 rd	Production and utilization of Methane, water gas, producer gas,carbureted water gas, coke oven gas, blast furnace gas, natural gas, mixed gas.
4 TH	1 st	Furnaces and Their Types
	2 nd	Overview of Furnace, Types of Metallurgical furnaces (a) heat treatment furnace (b) melting furnace
	3 rd	(c) smelting furnace (d) refining furnaces
5 TH	1 st	Heat losses in furnace .Types of waste heat recovery system such as regenerators andrecuperators
	2 nd	revision
	3 rd	revision
6 TH	1 st	Refractories – Basics and Classification
	2 nd	Introduction to Refractory materials
	3 rd	Classification of Refractories,
7 TH	1 st	properties of Refractories.
	2 nd	Special refractories like high alumina, mullite, SIC, Zirconia
	3 rd	Criteria for selection and types of refractories selected for blast furnace,
8 TH	1 st	L.D furnace, arc furnace, coke oven.
	2 nd	Revision
	3 rd	Revision
9 TH	1 st	Recent advancements in Fuels, Furnaces & Refractory

10 th	2 nd	Carbon Capture & Utilization (CCU) in Fuel Technologies:
	3 rd	CO ₂ Sequestration in Industrial Applications,
	1 st	Clean Coal Technologies,
11 th	2 nd	Advanced Refractory Materials:
	3 rd	Nano-Refractories, Graphite-Based & Carbon-Composite Refractories,
	1 st	Ultra-High-Temperature Ceramics (UHTCs
12 th	2 nd	, Alternative Fuels for Industrial Heating:
	3 rd	Waste-Derived Fuels, Hydrogen, Syngas, Carbon- Neutral and Carbon-Negative Technologies,
	1 st	Waste-Derived Fuels, Hydrogen, Syngas, Carbon- Neutral and Carbon-Negative Technologies,
13 th	2 nd	Waste-Derived Fuels, Hydrogen, Syngas, Carbon- Neutral and Carbon-Negative Technologies,
	3 rd	Revision
	1 st	Eco-Friendly Furnace Technologies
14 th	2 nd	Eco-Friendly Furnace Technologies
	3 rd	Revision
	1 st	Revision
15 th	2 nd	Carbon Capture & Utilization (CCU) in Fuel Technologies: CO ₂ Sequestration in Industrial Applications, Clean Coal Technologies, Advanced Refractory Materials:
	3 rd	Revision
	1 st	Class Test
15 th	2 nd	Class Test
	3 rd	Revision

Prepared by
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20/07/26

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