LESSON PLAN FOR ACADEMIC SESSION: 2025-26 (Winter)

Discipline: Metallurgical Engineering	Semester : 3rd	Name of the Teaching Faculty : Arpita Jena
Subject : FUEL, FURNACE & REFRACTORIES	No. of days / week class allotted	Semester From : 15/07/2025 to 15/11/2025 Nos. of Weeks per semester : 15
Week	**Class Day**	**Theory Topics**
1ST	1st	Introduction to Fuels
	2nd	Definition and classification of fuels (solid, liquid, and gaseous fuels) , Sources of fuel and their uses in industries
	3rd	Calorific value: gross and net calorific value
2ND	1st	Proximate and ultimate analysis of fuels
	2nd	Physical and chemical properties of fuels (moisture content, ash, sulfur, carbon content)
	3rd	Types of Fuels (Solid Fuels Liquid Fuels Gaseous Fuels)
3RD	1st	Origin of Coal
	2nd	Coal: types, composition, and classification
	3rd	Coking properties and swelling index of coal
4TH	1st	Carbonization of coal
	2nd	Differentiate between H.T.C and L.T.C
	3rd	Test carried out for coke(Shatter and Micum index)
5TH	1st	Origin and constitution of petroleum
	2nd	Discuss on flash point, fire point
	3rd	Cloud point, pour point, aniline point
6TH	1st	Octane number and cetane number
	2nd	Production and utilization of Methane
	3rd	Water gas, producer gas
7TH	1st	Carbureted water gas
	2nd	Coke oven gas, blast furnace gas
	3rd	Natural gas, mixed gas

8TH	1st	Furnaces and Their Types
	2nd	Furnaces and Their Types
	3rd	Heat treatment Furnace, Melting furnace, smelting furnace, refining furnaces
9TH	1st	Heat losses in furnace
	2nd	Types of waste heat recovery system such as regenerators and recuperators.
	3rd	Introduction to Refractory materials
10TH	1st	Classification of Refractories
	2nd	Properties of Refractories
	3rd	Special refractories
11TH	1st	High alumina, mullite, SIC, Zirconia
	2nd	Criteria for selection
	3rd	Types of refractories selected for blast furnace
12th	1st	L.D furnace
	2nd	Arc furnace
	3rd	Coke oven
13th	1st	Carbon Capture & Utilization (CCU) in Fuel Technologies
	2nd	Sequestration in Industrial Applications, Clean Coal Technologies
	3rd	Advanced Refractory Materials
14th	1st	Nano-Refractories, Graphite-Based & Carbon-Composite Refractories, Ultra-High-Temperature Ceramics (UHTCs)
	2nd	Alternative Fuels for Industrial Heating
	3rd	Waste-Derived Fuels, Hydrogen, Syngas, Carbon- Neutraland
15th	1st	Carbon-Negative Technologies
	2nd	Eco-Friendly Furnace Technologies: Hybrid & Solar- Assisted Furnaces
	3rd	Revision

Prepared by
Arpita Jena

Head of the Department
(Metallurgy Engineering)
GP Sonepur

Academic co-ordinator
GP Sonepur