

PADMASHREE KRUTARTHA ACHARYA INSTITUTE OF ENGINEERING & TECHNOLOGY, BARGARH



LESSON PLAN Session-2024-2025

Semester: 4th Discipline: Metallurgy Engg.

Subject: Sponge Iron & Ferro Alloys

Name of the Teaching Faculty: Dillip Ku. Meher

Subject: Sponge Iron & Ferrous alloysNo. of Days/per week class allotted: 04Semester From Date: 4.2.2025To Date: 17.5.2025No. of Weeks: 15

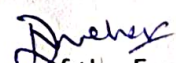
Week	Class Day	Theory /Practical Topics
01	1	Historic development- Rapid growth of reason for DR process
	2	Evolution of DRI Process Conventional vs DRI process
	3	Direct reduction of iron ore
	4	Principles of direct Reduction Reactions
02	1	Reaction between coal, oxygen & CO_2
	2	Reaction between iron ore & CO
	3	Reaction mechanism for coal based DRI
	4	Reaction mechanism for Gas based DRI
03	1	Reduction by Carbon monoxide
	2	Reduction by Hydrogen
	3	Boudouard reaction, Carbon deposition
	4	Carbon deposition


Signature of the Faculty

Subject: Sponge Iron & Ferro-alloys No. of Days/per week class allotted : 04

Semester From Date : 4-2-2025 To Date: 7-5-2025 No. of Weeks : 15

Week	Class Day	Theory /Practical Topics
04	1	Kinetic in DRI
	2	Reducibility of iron ore
	3	Rate controlling theories
	4	Major direct reduction processes DR processes using rotary kilns
05	1	SL/RN, CODIR
	2	TDR, OSIL,
	3	Rotary hearth process based on Inmetco, Itmk-3
	4	Tunnel kiln processes, hogans
06	1	Gas based direct reduction HYL processes
	2	MIDREX
	3	Fluidwise bed processes FIOR-HIB
	4	Uses of DRI in iron making, steel making


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Semester From Date : 4.2.2025 To Date: 7.5.2025 No. of Weeks : 15

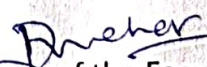
Week	Class Day	Theory /Practical Topics
07	1	Raw materials of sponge iron making
	2	chemical composition, Reductibility Strength, Bulk density
	3	Tests on iron coking coal Effects of iron ore size on reduction
	4	Carbon enrichment-
08	1	Flow of solids in Reactor or kiln Process Parameters of sponge iron production
	2	Process Parameters of sponge iron production
	3	Daily operating parameters (DRI plant)
	4	Process Pr. Fluctuations, Temperature deviations
09	1	Back spill, Loss of product quality
	2	Major Problems of DRI kiln, Injection coal jam
	3	Feed pipe jam, Main Drive Problem
	4	Refractory failure Causes & remedies


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Semester From Date : 4.2.2025 To Date: 7-5-2025 No. of Weeks : 15

Week	Class Day	Theory /Practical Topics
10	1	Shutdown procedure Normal shutdown for 500T DP kiln
	2	Normal shutdown for 500 TDP kiln
	3	Normal shut down for 500 TDP kiln
	4	The startup process, Accretion formation
11	1	key notes on process plant operation
	2	Sampling of sponge iron & raw materials
	3	Chemical analysis of sponge iron
	4	Reactor feed Iron ore, Sinter coal
12	1	Determination of FeT, Ferrous iron & metallic Fe.
	2	Air pollution mitigation measures
	3	Fugitive Dust Generation
	4	Water Pollution Mitigation Measures


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Semester From Date: 4.2.2025 To Date: 7.5.2025 No. of Weeks: 15

Week	Class Day	Theory /Practical Topics
13	1	Solid waste generation & disposal
	2	Hazardous wastes & chemicals
	3	Hazardous waste & chemicals
	4	occupational health & safety
14	1	occupational health & safety
	2	Environmental Monitoring
	3	Environmental standards
	4	Introduction to Ferroalloying elements
15	1	Different- ferro alloys
	2	General methods of producing ferro-alloys
	3	Refining of ferro-alloys
	4	Production of individual ferro-alloys (Fe-Ti, Fe-W, Fe-Mo, Fe-V)


Signature of the Faculty