

Lesson Plan

Subject: Sponge Iron & Ferrous Alloy (TH-4) Name of faculty: Sagarika Palei

Semester: 4TH Class allotted: 4p/week Branch: METALLURGY Session: 2025(S)

Discipline	Semester	Fromdate:	Todate:	TeachingAid
Subject:	No.of days/per week	Theory/Practical–Topics/Lesson		
Week	Date/Period			
1	04/02/2025 TO 08/02/2025	1: Review of Sponge Iron Making Processes: Historical Development. Reasons for Rapid growth of DR process Chronological Evolutions of some of the DRI Processes Conventional versus DRI Steel Making Direct Reduction of Iron Ore.		WhiteBoard Marker Smart board
2	10/02/2025 TO 15/02/2025	2: Thermodynamics of Sponge Iron Making Principles of Direct Reduction Reactions. Reaction between Coal, Oxygen and Carbon dioxide. (Set-I). Reaction between Iron ore and CO (Set-II). Reaction Mechanism in Coal based DRI).		WhiteBoard Marker Smart board
3	17/02/2025 TO 22/02/2025	Reaction Mechanism in Gas based DRI. Reduction by Carbon monoxide . Reduction by Hydrogen . Boudourd reaction and Reduction by Carbon .		WhiteBoard Marker Smart board
4	24/02/2025 TO 01/03/2025	Carbon Deposition. Kinetics in DRI . Factors Influencing the Reducibility of Iron Ore. Rate Controlling Theories .		WhiteBoard Marker Smart board
5	03/03/2025 TO 08/03/2025	3: Major direct reduction processes Coal based DR process using rotary kilns. SL/RN,CODIR ,ACCAR, TDR , OSIL ,Krupp-Rein processes. Coal based processes using reactors other than rotary kilns. Rotary hearth processes based on Inmetco , fastmet,It mk-3, Tunnel kiln processes kinglor-meter,hogans		WhiteBoard Marker Smartboard


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Week	Date/Period	Theory/Practical–Topics/Lesson	Teaching Aid
6	01/03/2025 TO 15/03/2025	Gas based direct reduction HYL processes,MIDREX Fluidwise bed processes-FIOR-HIB . Uses of DRI in iron making and steel making.	WhiteBoard Marker Smartboard
7	17/03/2025 TO 22/03/2025	Chapter-4: Parameters of Sponge Iron Making: Raw materials of Sponge Iron Making . Chemical and Physical Tests on iron ore: Chemical composition, Reducibility, Strength, Tumbling, Abrasion and Shatter Index, Porosity, Bulk Density, Thermal Degradation Index (TDI). Tests on Non Coking Coal: Proximate and Ultimate Analysis, Reactivity, Calorific Value, Coking Index, Swelling Index, Ash Fusion Temperature, Bulk Density. Effect of Iron Ore size on Reduction.	Marker WhiteBoard
8	24/03/2025 TO 29/03/2025	Effect of Iron Ore size on Reduction . Carbon Enrichment of Sponge Iron . How Carbon Enrichment of Sponge Iron is performed . Flow of Solids in the Reactor or Kiln. Process Parameters of Sponge Iron Production: Raw materials, Iron Ore Feed Rate, Coal Feed Rate, C/FeRatio, Dolomite Feed, Rate, Reduction Coal to Blow Coal Ratio , Ratio of coarse and Fines in Blow Coal, Blow Coal Pressure, Temperature Profile, Kiln Speed,Ore Retention Time and Cooler Discharge end Pressur. Nonmagnetic Percentage in the Kiln Discharge e.	WhiteBoard Marker Smartboard
9	31/03/2025 TO 05/04/2025	5: DRI Plant Operation and Abnormalities: .Daily Operating Parameters. Operational Abnormalities: Process Pressure Fluctuations, Temperature Deviations, Back Spill, Loss of Process Fan(s), High Temperature of Cooler Discharge, Loss of Product Quality Major Problems of DRI Kiln Operation: Injection Coal Jam, Feed Pipe Jam, Transfer Chute Jam, Main Drive Problem, Refractory Failure their causes and remedies.	WhiteBoard Marker Smart board
10	07/04/2025 TO 12/04/2025	Shutdown Procedure: Normal Shutdown Schedule for a 500 TDP Kiln. The Start Up process: Heating of the Reactor Refractory . Accretion Formation . Key notes on process plant operation. Retention Time and Cooler Discharge end Pressure .	Marker WhiteBoard Smart board
11	14/04/2025 TO 19/04/2025	Sampling: Sponge Iron and the Raw materials . Chemical Analysis of Sponge Iron, Iron Ore, Lime Stone/Dolomite and Coal . Scheme of Quality Control of input Raw Materials: Reactor Feed Iron Ore, Reactor Feed Coal, Back –Spill Coal, Slinger Coal,	WhiteBoard Marker Smart board
12	21/04/2025 TO 26/04/2025	Determination of Total Iron (FeT), Ferrous Iron and metallic Fe. 7: Environmental Management in DRI Plants: Air Pollution Mitigation Measures . Fugitive Dust Generation . Water Pollution Mitigation Measures.	Marker WhiteBoard Smart board

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13.	28/04/2025 TO 03/05/2025	Solid Waste Generation and Disposal . Hazardous Wastes and Chemicals . Occupational Health and Safety. Environmental Monitoring . Environmental Standards.	White Board Marker Smart board
14	05/05/2025 TO 10/05/2025	8: Production of Ferro-alloys: Introduction to Ferro-alloying elements. Different Ferro alloys. General methods of producing Ferro alloys: carbothermic and aluminothermy reductions.	White Board Marker Smart board
15	12/05/2025 TO 17/05/2025	Refining of Ferro alloys. Production of individual Ferro alloys: Ferro manganese, Ferro chrome, charge chrome, ferrosilicon Fe-Ti, Fe-W, Fe-Mo and Fe-V	White Board Marker smart Board


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