

PADMASHREE KRUTARTHA ACHARYA INSTITUTE OF ENGINEERING & TECHNOLOGY, BARGARH



LESSON PLAN Session-2023-2024

Discipline: Metallurgical Engg. Semester: 4th

Subject: SIFA

Name of the Teaching Faculty: Anadi Charan Jena

Subject: SIFA No. of Days/per week class allotted: 04

Semester From Date: 16-01-2024 To Date: 26-04-2024 No. of Weeks: 15

Week	Class Day	Theory / Practical Topics
1st Topic-1	1st	Review of sponge iron making processes
	2nd	Historical developments, Rapid growth
	3rd	Chronological evolutions
	4th	Conventional vs DRI steel making, Direct reduction
2nd Topic-2	1st	Thermodynamics of sponge iron making
	2nd	Direct reduction reactions
	3rd	Reaction between coal, oxygen and CO ₂
	4th	Reaction between ore and CO
3rd	1st	Reaction mechanism in coal based DRI
	2nd	Reduction by CO and H ₂
	3rd	Reduction by carbon, Boudouard reaction
	4th	Reaction mechanism in gas-based DRI


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Week	Class Day	Theory / Practical Topics
4th	1st	Carbon deposition reaction
	2nd	Kinetics in DRI
	3rd	Reducibility of iron ore, factors
	4th	Rate controlling factors
5th Topics	1st	Major DRI processes
	2nd	Coal based DRI processes
	3rd	Coal based processes using reactors
	4th	contd.
6th	1st	Gas-based DRI processes
	2nd	Gas-based DRI processes (contd.)
	3rd	Gas-based DRI processes
	4th	Uses of DRI in iron making and steel making


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Week	Class Day	Theory / Practical Topics
7th Topic-4	1st	Parameters of sponge iron making, Raw materials
	2nd	physical and chemical testing
	3rd	Tests on non-coking coal
	4th	Effects of ore size on reduction, Carbon enrichment.
8th	1st	Flow of solids in the reactor
	2nd	Process parameters
	3rd	contd.
8th	4th	Process parameters, non-magnetic in Kiln discharge
9th Topic-5	1st	Plant operation and abnormality
	2nd	operational abnormality
	3rd	Major problems in DRI Kiln operation
	4th	Shut down procedure


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Week	Class Day	Theory /Practical Topics
10 th	1 st	start-up process
	2 nd	Accretion formation
	3 rd	Accretion control
	4 th	Process plant operation
11 th Topic-6	1 st	Quality control in DRI plant, sampling.
	2 nd	chemical analysis
	3 rd	contd.
	4 th	Scheme of quality control
12 th	1 st	scheme of quality control
	2 nd	Determination Fe(T), Fe, Fe(M)
	3 rd	Environmental management
	4 th	AES pollution, fugitive dust generation.



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13 th	1st	Water pollution
	2nd	Solid waste generation
	3rd	Wastes and chemicals
	4th	Health and Safety, environmental standards
14 th Topic-9	1st	Production of Ferro-alloys, alloying elements
	2nd	Different ferro-alloys
	3rd	Carbothermic and aluminothermic reactions
	4th	Production of Fe-Ti, Fe-Mn
15 th	1st	Production of Fe-W, Fe-Cr
	2nd	production of Fe-Si, Fe-Mo
	3rd	Production of charge chrome, Fe-V, Ferro-alloy refining
	4th	Ferro-alloy refining processes



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