GOVERNMENT POLYTECHNIC JAJPUR

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DEPARTMENT OF METALLURGICAL ENGINEERING

LESSON PLAN

Discipline Metallurgy	Semester 4th	Name of teaching faculty: **Biren Kumar Samal** P.T.G.F in metallurgy
Subject S.I.F & A	No day/ week class: 4	**No of week:** 15 **Session:** Summer-2023 (14/02/2023 to 23/5/2023)
Week	Class Day	Topic
1st	1st	**Chapter-1:Introduction to sponge iron making**
	2nd	Reasons for Rapid growth of DR Process
	3rd	DRI Steel Making
	4th	Direct Reduction of Iron Ore
2nd	1st	Chapter-2: Principles of Direct Reduction Reaction
	2nd	Reaction between Coal, Oxygen and Carbon dioxide. (Set-I)
	3rd	Reaction between Coal, Oxygen and Carbon dioxide. (Set-I)
	4th	Reaction between Iron ore and CO (Set-II)
3rd	1st	Reaction between Iron ore and CO (Set-II)
	2nd	Reaction Mechanism in Coal based DRI
	3rd	Reaction Mechanism in Gas based DR
	4th	Reduction by Carbon monoxide
4th	1st	Reduction by Hydrogen
	2nd	Boudourd reaction and Reduction by Carbon
	3rd	Boudourd reaction and Reduction by Carbon deposition
	4th	Kinetics in DRI
5th	1st	Factors Influencing the Reducibility of Iron Ore
	2nd	**Chapter-3: Major direct reduction processes**
	3rd	Coal based DR process using rotary kilns.
	4th	SL/RN process
6th	1st	CODIRprocess
	2nd	ACCARprocess
	3rd	TDR process

	4th	OSIL process
7th	1st	Krupp process
	2nd	Coal based processes using reactors other than rotary kilns
	3rd	Rotary hearth processes
	4th	Tunnel kiln processes
8th	1st	Fastmet
	2nd	Inmetco
	3rd	Gas based direct reduction
	4th	HYL processes
9th	1st	Midrex
	2nd	Fluidwise bed processes-FIOR-HIB
	3rd	Uses of DRI in iron making
	4th	**Chapter-4: Parameters of Sponge Iron Making:** Raw materials
10th	1st	Chemical and Physical Tests on iron ore
	2nd	Reducibility, Strength, Tumbling, Abrasion and Shatter Index
	3rd	Porosity, Bulk Density, ThermalDegradation Index (TDI).
	4th	Proximate and Ultimate Analysis
11th	1st	Reactivity, CalorificValue, Coking Index, Swelling Index, Ash Fusion Temperature, Bulk Density
	2nd	Carbon Enrichment of Sponge Iron
	3rd	Coal Feed Rate, C/FeRatio
	4th	Chapter-5: DRI Plant Operation and Abnormalities
12th	1st	Operational Abnormalities: Process Pressure Fluctuations, Temperature Deviations
	2nd	Back Spill, Loss ofProcess Fan(s)
	3rd	High Temperature of Cooler Discharge, Loss of Product Quality
	4th	Coal Jam, Feed Pipe Jam
13th	1st	Main Drive Problem, Refractory Failure theircausesand remedies
	2nd	Shutdown Procedure
	3rd	Accretion Formation
	4th	**Chapter-6: Quality Control in Sponge Iron Plant** Chemical Analysis of Sponge Iron
14th	1st	Chemical Analysis of Iron ore
	2nd	Chemical Analysis of limestone
	3rd	Feed Coal, Back –Spill Coal, Slinger Coal
	4th	Determination of Total Iron (FeT), Ferrous Iron and metallic Fe

	4th	
15th	1st	Chapter-7: Environmental Management in DRI Plants: Air Pollution Mitigation Measures
	2nd	Solid Waste Generation and Disposal, Hazardous Wastes and Chemicals
		Chapter - 8: Production of Ferro-alloys: Introduction to Ferro-alloying elements
	3rd	Ferro manganese, Ferro chrome, ferrosilicon
		Fe-Ti
	4th	Fe-Mo

Signature of faculty

14/02/2023