

# KIIT POLYTECHNIC, BHUBANESWAR

## LESSON PLAN

Session 2022-23

Discipline : Metallurgical Engineering	Semester: 4th, Summer/2023	Name of the Faculty: Manas Ranjan Behera Lecturer E-mail Id: mrbeherafmt@kp.kiit.ac.in
Subject: Principles of extractive metallurgy (Th.3)	No. of Days/Week: 4	Start date: 13/02/2023 End date: 23/05/2023
<b>Week</b>	<b>Class Day</b>	<b>Theory Topics</b>
1st	1st	Definition of metallurgical terms
	2nd	Definition of ores and minerals
	3rd	Definition of gangue, flux and slag
	4th	Definition of matte, speiss, metals and alloys
2nd	1st	Discussion on possible questionnaire
	2nd	Principles of pre-treatment of ores for metal extraction
	3rd	Explanation of drying
	4th	Definition of calcinations and its explanation
3rd	1st	Definition of agglomeration processes and different types of it
	2nd	Explanation of briquetting process
	3rd	Explanation of nodulising process
	4th	Explanation of vacuum extrusion process
4th	1st	Explanation of sintering process
	2nd	Explanation of pelletizing
	3rd	Discussion on possible questionnaire
	4th	Introduction to General Methods of Extraction
5th	1st	Explanation of pyrometallurgical processes
	2nd	Explanation of roasting and different roasting methods
	3rd	Explanation of Ellingham diagram (oxides)
	4th	Explanation of predominance area diagram (sulphides)
6th	1st	Explanation of smelting and different smelting practices
	2nd	Explanation of Flash smelting, Hearth smelting and Matte smelting
	3rd	Explanation of distillation and sublimation

	4th	Quiz test
7th	1st	Converting of matte
	2nd	Converting of pig iron
	3rd	Explanation of hydrometallurgical process
	4th	Explanation of different stages of hydrometallurgical process
8th	1st	Flow diagram of hydrometallurgical process
	2nd	Explanation of leaching and different leaching methods
	3rd	Bacteria leaching and pressure leaching
	4th	Discussion on possible questionnaire
9th	1st	Explanation of Electrometallurgical process
	2nd	Definition of electrolysis, ionic conductivity, EMF series
	3rd	Faraday's law of electrolysis
	4th	Explanation of Faraday's 1 <sup>st</sup> law
10th	1st	Explanation of Faraday's 2 <sup>nd</sup> law
	2nd	Explanation of electro wining and electro refining
	3rd	Discussion on possible questionnaire
	4th	Introduction to basic approaches to refining
11th	1st	Explanation of refining process
	2nd	Explanation of zone refining
	3rd	Explanation of fire refining
	4th	Quiz test
12th	1st	Introduction to Principles of metal extraction
	2nd	Principles of metallurgical thermodynamics, zeroth law, 1 <sup>st</sup> law of thermodynamics
	3rd	2 <sup>nd</sup> law of thermodynamics
	4th	3 <sup>rd</sup> law of thermodynamics
13th	1st	Concept of Internal energy, enthalpy, entropy change and free energy
	2nd	Application of thermodynamics laws to metallurgical process.
	3rd	Henry's law
	4th	Sivert's law
14th	1st	Discussion on possible questionnaire
	2nd	Introduction to reaction Kinetics
	3rd	First order reaction and its significance

	4th	Application of 1 <sup>st</sup> order reaction to metallurgical processes
15th	1st	Radioactive decay and Half life period
	2nd	Discussion on previous year's question
	3rd	Practice test
	4th	Practice test

Recommended book: 1.Extraction of non-ferrous metals by H.S.Ray, Shridhar&Abraham

2. Principle of Extractive metallurgy by A.Ghosh & H.S.Ray