EXTRACTIVE METALLURGY AND ALLOY PRODUCTION

Code	Credit Hour
MinE-852	3-0

CourseDescription

Recognize Extraction and production of iron ore by blast furnace, Layout of direct reduction processes in iron making, Summarize Chemical reaction in pyro-metallurgy, Define batch and continuous steel– making, Identify the Extraction of non–ferrous metals, e.g., aluminum, copper, Titanium, uranium, and manganese Metals, Recognize Extraction by hydrometallurgy, Apply leaching technique in metallurgical processes, Solve problem in metallurgical balance in hydrometallurgy process, Describe Production of alloys and alloys characterization, Apply computer application in metallurgical engineering.

Textbook:

1. J. D. Gilchrist ―Extraction metallurgy, 2nd Edition, Pergamon Press 2002

ReferenceBook:

1. Course Notes: First day materials, Course project, Guide to assignment

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	15%
Assignment	5%
Mid Terms	30%
ESE	50%

TeachingPlan

Week No	Topics	LearningOutcomes
1	Introduction	CourseOutline,objectives,teachingplan,assessmentmethod, conceptsreview. Introduction to extractive metallurgy

		and alloy production
2-3	Iron Ore Extraction and Production	Introduction to iron ore extraction and production, detailed study of the blast furnace process, Components and layout of a blast furnace, Steps in iron ore reduction in a blast furnace, Review and quiz on blast furnace iron making, Overview of direct reduction processes, Comparison between blast furnace and direct reduction processes
4	Pyro-metallurgy and Chemical Reactions	Introduction to pyro-metallurgy, Chemical reactions involved in pyro-metallurgy, Examples of pyro-metallurgical processes, Review of chemical reactions in pyro-metallurgy, Quiz on pyro-metallurgical reactions, Introduction to batch steel-making processes, Introduction to continuous steel-making processes
5-6	Steel-making Processes	Detailed study of batch steel-making processes, Detailed study of continuous steel-making processes, Comparison of batch and continuous processes, Review and quiz on steel-making processes, Introduction to extraction of non-ferrous metals, Extraction of aluminum Extraction of copper
7-8	Extraction of Non-Ferrous Metals	Extraction of titanium, Extraction of uranium, Extraction of manganese, Review of non-ferrous metal extraction processes, Quiz on non-ferrous metals extraction, Introduction to hydrometallurgy, Principles of hydrometallurgical extraction
9	**MIDTERM EXAM**	
10-11	Hydrometallurgy and Leaching Techniques	Detailed study of hydrometallurgical processes, Leaching techniques in metallurgical processes, Applications of leaching techniques, Review of hydrometallurgy and leaching, Quiz on hydrometallurgy and leaching, Problem-solving in metallurgical balance, Case studies on metallurgical balance in hydrometallurgy
12-13	Metallurgical Balance and Alloys Production	Solving problems in metallurgical balance, Introduction to production of alloys, Alloy characterization techniques, Examples of common

		alloys and their properties, Review of alloy production and characterization, Quiz on alloy production, Introduction to computer applications in metallurgical engineering
14-15	Computer Applications in Metallurgical Engineering	Software tools used in metallurgical engineering, Case studies of computer applications in metallurgy, Simulation techniques in metallurgical processes, Review of computer applications in metallurgy, Practical session on using software tools, Advanced topics in computer applications Quiz on computer applications
16-17	Review and Advanced Topics	Comprehensive review of all topics covered, Advanced topics in iron and steel production, Advanced topics in non-ferrous metals extraction, Advanced hydrometallurgy techniques, Review session for final assessment, Final assessment preparation, Final assessment and feedback
18	**END SEMESTER EXAM**	