

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 4

METALLURGY ENGINEERING

Subject Name: PRINCIPLES OF EXTRACTIVE METALLURGY

Sr. No.	Course content
1.	Basics of Pyrometallurgical Processes: Drying. Calcination. Pelletizing, Sintering. Roasting. Smelting. Converting. Refining processes with examples for metals like Aluminium, Copper, Zinc, Lead.
2.	Basics of Hydrometallurgical processes Fundamentals of Unit processes and Unit operations. Hydrometallurgical processes. Principles and types of Leaching. Refining of leached solution. Solvent extraction and ion-exchange processes.
3.	Basics of Electrometallurgical processes Electrowinning and Electrorefining. Aqueous and Fused salt electrolysis.
4.	Flow-sheets of Extraction of Important Metals Simplified Flow-sheets for the production of Iron and Steel, Aluminium, Copper, Zinc and Lead.
5.	Ellingham diagrams Free-Energy-Temperature diagrams (Ellingham diagrams) for the formation of Oxides, Sulphides and Chlorides and their applications.
6.	Reaction Kinetics Order of Reaction and Molecularity. Arrhenius Equation. Theories of Reaction Kinetics. Role of Activation Energy. Collision Theory. Theory of Absolute Reaction Rate.

REFERENCEBOOKS:

- 1) Principles of Extractive Metallurgy
-A. Ghosh and H. S. Ray
- 2). Extractive Metallurgy
-Joseph Newton
- 3). Chemical Metallurgy
-R. H. Parkar
- 4). Extraction of Non-ferrous Metals
-H. S. Ray, R. Sridhar and K. P. Abraham
- 5) Principles of Extractive Metallurgy
-T. R. Rosenquist (Pub.-Mc Graw Hill)
- 6). Extractive Metallurgy