

PMI5H001 EXTRACTIVE METALLURGY (4-0)
(Optional Elective Paper)

Module I

(12 hours)

Unit processes in pyrometallurgy: Calcination and roasting, sintering, smelting, converting, reduction, smelting-reduction, metallothermic and hydrogen reduction; distillation and other physical and chemical refining methods – their thermodynamic and kinetic treatment with appropriate examples.

Module- II

(12 hours)

Unit processes in hydrometallurgy: Leaching, purification of leach liquor, solvent extraction, ion-exchange process, potential-pH diagrams, different metal recovery processes from aqueous phase, bacteria leaching.

Module-III

(14 hours)

Electrometallurgy: Faraday's Laws of Electrolysis, concept of overvoltage, limiting current density, total cell voltage, series and parallel electrical circuits in refining, aqueous and fused salt electrolysis, electro refining of common metals like Cu, Zn, Ag, Au, Ni, Mn, Al, Mg etc

Module-IV (14 hours)

Numerical problems relevant to different pyro- , hydro- and electrometallurgical processes.

Reference:

1. Principles of Extractive Metallurgy by Ahindra Ghosh and H. S. Ray
2. Fundamentals of Metallurgical Processes by L. Coudurier, D. W. Hopkins and I. Wilkomirsky
3. Metallurgical Problems by A. Butts
4. Electrochemical Engineering by C. L. Mantell