MM1403: Principles of Extractive Metallurgy (3-1-0)

UNIT-I: Importance of mineral dressing, Equipments and steps involved-liberation, comminution, Principles of Crushing, Grinding and Grindability. Evaluation of Particle size, size distribution curves and their significance.


UNIT-III: Fuels for metallurgical processes, Refractories and their uses, Reactor design considerations, sizing of fluidized and fixed bed metallurgical reactors. Unit Processes in pyrometallurgy: Drying, calcination, roasting, pelletising and sintering. Thermodynamics of metal extraction, Slags-classification and properties. Reduction, smelting in shaft furnace, alternative reductants, hydrogen as reductant, metallothermic reduction. Thermodynamic principles and applications of matte smelting and converting. Flash smelting and submerged bath smelting.

UNIT-IV: Principles of metal refining with examples for metals like Cu, Ni, Pb, Sn and Zn; design of metal separation using high temperature distillation. Unit processes in hydrometallurgy: leaching, purification of leach liquor, solvent extraction and ion exchange systems and flow sheet design.


References:

1. Principal of Extractive Metallurgy by Terkel Rogenavist
2. Extractive Metallurgy by Joshep Newton
3. Extraction of Non-ferrous metals by H.S.Ray
4. Process Selection in extractive Metallurgy by Peter Hayes
5. Economic Geology by Umeshwar Prasad
6. Economic Geology by N.L.Ram and Sharma