

PMM335: EXTRACTIVE METALLURGY

L	T	P	Cr
3	1	0	3.5

Course Objective(s): To provide overall descriptions of unit processes of mineral beneficiation and extractive metallurgy, particularly for non-ferrous metals. To provide backgrounds of the individual processes involved in different stages of extraction.

Ores and Minerals: Important ores and minerals and their occurrence in India; beneficiation of ores and minerals, various comminution processes, its theories description and applications.

Concentration of Ores: Various concentration techniques and their applications, Mineral dressing circuits and Flow sheets.

Refractory: Types, classification, Properties and testing, their selection and applications. Unit processes in pyrometallurgy, Calcinations, Roasting, Agglomeration, Reduction smelting, Matte, smelting, Flash smelting, Converting, Distillation, Refining with suitable examples.

Unit Processes in Hydrometallurgy: Leaching, Purification of leach liquor, Solvent extraction and ion exchange process, Techniques of metal recovery from aqueous phase and their applications.

Unit Processes in Electrometallurgy: Faraday's laws of electrolysis, Concept of over voltage, Limiting current density, Electro-winning and Electro-refining with reference to Cu, Zn, Al etc. Flow sheets and numerical calculations including material balance and heat balance.

Course Learning Outcomes (CLO):

Students will be able to understand different industrial techniques associated with the process metallurgy of non-ferrous metals.

Recommended Books:

1. Mohanty A.K., *Rate Processes in Extractive Metallurgy*, Prentice Hall of India, (2009).
2. *Principles of Extractive Metallurgy*, Terkel Rosenqvist, Tapir Academic Press, (2004).
3. *Principles of Extractive Metallurgy*, H. S. Ray and A. Ghosh, New Age International, (1991).