

4th Semester	RMM4C003	Principles of Extractive Metallurgy	L-T-P 3-0-0	3 CREDITS
--------------------------------	-----------------	--	------------------------	------------------

Module-I (9 hours)

Unit processes in Pyrometallurgy: Calcination and roasting, sintering, smelting, converting, reduction, smelting-reduction, metallothermic and hydrogen reduction.

Module-II (8 hours)

Distillation and other physical and chemical refining methods: Fire refining, Zone refining, Liquefaction and Cupellation. Small problems related to pyro-metallurgy.

Module-III (10 hours)

Unit processes in Hydrometallurgy: Leaching practice: In situ leaching, Dump and heap leaching, Percolation leaching, Agitation leaching, Purification of leach liquor, Kinetics of Leaching; Bio-leaching: Recovery of metals from Leach liquor by Solvent Extraction, Ion exchange, Precipitation and Cementation process.

Module-IV (8 hours)

Importance of potential-pH diagram.

Some process flow sheet: recovery of Au from leach liquors, recovery of Nickel and Cobalt

Small problems relate to hydrometallurgy

Module-V (10 hours)

Unit Process in 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, Au, Ni,

Al, Mg etc. Electroplating

Small related problems to Electrometallurgy

Books:

- Principles of Extractive Metallurgy by T. Rosenqvist.
- Principles of Extractive Metallurgy by Ahindra Ghosh and H. S. Ray.
- Unit Processes of Extractive Metallurgy by R. D. Pehlke.
- Fundamentals of Metallurgical Processes by L. Coudurier, D. W. Hopkins and I. Wilkomirsky.
- Metallurgical Problems by A. Butts.
- Electrochemical Engineering by C. L. Mantell.
- Principles of Mineral Dressing by A. M. Gaudin.
- Text Book of Ore Dressing by R. H. Richards and C. E. Locks.
- Element of Ore Dressing by A.E. Taggart.

B.Tech (MME / Metallurgical Engineering) Syllabus from Admission Batch 2018-19 *4th Semester*

- Handbook of Mineral Dressing- Ores and Industrial Minerals by A.E. Taggart.
- Textbook of Ore Dressing by S.J. Trusscott.
- Ore Dressing by S.K. Jain.
- Mineral Processing Technology by Berry A Willis.