



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3132103

Semester – III

Subject Name: Mineral Processing

Type of course: Engineering Science

Prerequisite: None

Rationale: The Mineral Processing program is offered to prepare students for careers in engineering where Mineral Processing can be applied to the advancement of technology. This education at the intersection of engineering and Mineral Processing will enable students to seek employment in engineering upon graduation while, at the same time, provide a firm foundation for the pursuit of graduate studies in engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction and scope of Mineral processing: Introduction and scope of mineral processing in extractive metallurgy. Ores, Mineral resources in India and worldwide for basic metals like Iron, Copper ,Aluminium, lead, Zinc. Physical and chemical characteristics of industrial minerals . Terminology in mineral processing. Economics of ore processing	08
2	Liberation, Comminution, Sizing and classification : Liberation and its significance, Comminution and sizing, Laws of Comminution, Crushing and Grinding- types and equipment. Washing, Sorting and hand-picking; Laboratory and industrial screening-equipment, screen efficiency; Classifier- mechanical and hydraulic, sizing and sorting classifiers	10
3	Minerals Separation Processes : Gravity concentration methods, Tabling, Jigging, Heavy media separation, Separation in vertical and streaming currents, Sedimentation, Dewatering techniques, Thickener, Filtration and Drying.	10
4	Froth flotation: Physico-Chemical principles, reagents like collectors, modifiers and frothers. Process variables in floatation, Study of flow sheet for flotation of sulphide ores	06
5	Magnetic and Electrostatic separation : principles, wet and dry separators, High tension separation, Motion of solid in fluid, Stokes and Newton's law, Free and hindered settling, Thickening, Batch and continuous settling chambers	04
6	Simplified beneficiation Flow Sheets of coal and ores of metals : Beneficiation flow sheets of coal and simple ores of copper, lead, zinc, Iron and with	04



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reference to Indian deposits.	
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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	40	25	15	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Identify ores and minerals.	25%
CO-2	Choose comminution and mineral separation operation for a given ores and minerals.	50%
CO-3	Predict beneficiation of various ores and minerals.	10%
CO-4	Analyze mineral processing operations.	15%

Reference Books:

1. Principles of Mineral Dressing, A. M. Gaudin, Tata McGraw Hill.
2. Will's Mineral Processing Technology by B. A. Wills & T. J. Napier-Munn.
3. Mineral Processing: (Including Mineral dressing, Experiments and numerical)
Vandana Rao, Sonam Patel & Avinash Lele, IK International Publishing House pvt. Ltd.
4. Mineral Processing Technology, S K Jain, CBS Publisher.
5. Experiments in Mineral Processing, S. Venkatachalam.
6. Mineral Processing, E. J. Pryor, Pergamon Press.

List of Experiments:

1. Identification of different ores and minerals.
2. Determine the reduction ratio of given ore sample by Jaw crusher.
3. Perform secondary crushing operation of primary crushed ore by roll crusher.
4. Determine the grinding efficiency of Ball mill.
5. Obtain particle size distribution for given ore sample by sieve shaker.
6. Separate the ore particles as per the settling velocity by air classifier.
7. Demonstrate the jigging machine.
8. Demonstrate froth flotation cell for separation of ore fines.
9. Solve numerical based on different ore dressing processes.



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Major Equipment: Roll crusher, Jaw crusher, Sieve shaker, Air classifier, Ball mill, Jigging machine, Froth floatation machine

List of Open Source Software/learning website:

- I. <http://nptel.iitm.ac.in/>
- II. <http://ocw.mit.edu/>