

NATIONAL INSTITUTE OF TECHNOLOGY, JAMSHEDPUR
(Metallurgical and Materials Engineering)
SUBJECT: MT 1403 Principle of Extractive Metallurgy

The subject of the mail should be: Assignment_PEM_2K18

File name should be Registration No_ Title of the assignment,

Last date for submitting Assignment in doc form: 27th January 2020

The presentation will start from 28-01-2020 as per schedule is given below.

Marks distribution will be as follows: 1. Content - 10, 2. Way of presentation - 10, 3. Asking Question - 10, 4. Answer - 10, Timing – 10.

Day	Topic	Roll No.	Date
1	Equipments and steps involved-liberation, comminution	1, 41, 85, 100	28th Jan 2020
1	Principles of Crushing, Grinding and Grindability.	2, 40, 86	28th Jan 2020
2	Evaluation of Particle size, size distribution curves and their significance	3, 39, 87	30th Jan 2020
2	Mechanism of breakage of materials	4, 38, 88	30th Jan 2020
3	industrial screening	5, 37, 89	4th Feb 2020
3	classification, Dry and wet classifiers	6, 36, 90	4th Feb 2020
4	Free and hindered settling	10, 35, 91	5th Feb 2020
4	Thickness, hydroclones, filtration, agitation and mixing	8, 61, 92	5th Feb 2020
5	Tabling,	9, 60, 93	6th Feb 2020
5	Jigging	11, 59, 76	6th Feb 2020
6	Magnetic and Electrostatic separation	12, 58, 75	11th Feb 2020
6	Surface behaviour and flotation principles.	13, 57, 74	11th Feb 2020
7	Flotation Machines	14, 56, 73	12th Feb 2020
7	Fuels for metallurgical processes	15, 55, 72	12th Feb 2020
8	Refractories and their uses	16, 54, 67	13th Feb 2020
8	Reactor design considerations	17, 53, 68	13th Feb 2020
9	Reactor design considerations	18, 52, 69	18th Feb 2020
9	Sizing of fluidized and fixed bed metallurgical reactors	19, 51, 70	18th Feb 2020
10	Unit Processes in pyrometallurgy: Drying, calcination, roasting, pelletising and sintering	20, 50, 71	19th Feb 2020
10	Thermodynamics of metal extraction	21, 49, 77	19th Feb 2020
11	Slags-classification and properties.	22, 48, 78	20th Feb 2020
11	Reduction, smelting in shaft furnace,	23, 47, 79	20th Feb 2020
12	Alternative reductants, hydrogen as reductant, metallothermic reduction	24, 46, 80	25th Feb 2020
12	Thermodynamic principles and applications of matte smelting and converting	25, 45, 81	25th Feb 2020
13	Flash smelting and submerged bath smelting	26, 44, 82	26th Feb 2020
13	Principles of metal refining with examples for metals like Cu & Ni	27, 43, 83	26th Feb 2020
14	Principles of metal refining with examples for metals like Pb, Sn and Zn	28, 42, 84	27th Feb 2020
14	Design of metal separation using high temperature	29, 66, 94	27th Feb 2020

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	distillation		
15	Unit processes in hydrometallurgy: leaching, purification of leach liquor	30, 65, 95	3rd Mar 2020
15	Unit processes in hydrometallurgy: solvent extraction and ion exchange systems and flow sheet design	31, 64, 96	3rd Mar 2020
16	Numericals from chapter day 1 to day 7	32, 63, 98	4th Mar 2020
16	Numericals from chapter day 8 to day 15	33, 62, 99	4th Mar 2020

SYLLABUS

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-II: Mechanism of breakage of materials, industrial screening, classification. Dry and wet classifiers. Free and hindered settling. Thickness, hydroclones, filtration, agitation and mixing, tabling, jigging, magnetic and electrostatic separation. Surface behaviour and flotation principles. Flotation Machines.

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.

UNIT-V: Unit processes in electrometallurgy: Faradays laws of electrolysis, concept of overvoltage, limiting current density, overall cell voltage, series and parallel electrical circuits in refining. Electrowinning and electrorefining with reference to metals like Cu, Ni, Co, Cd, Fe, Zn, Al and Mg. Text Books: 1. Will's Mineral Processing Technology by B. Will and T. Napier-Munn 2. Principles of Extractive Metallurgy by Terkel Rosenqvist 3. Unit Processes of Extractive Metallurgy, R. D. Pehlke, Elsevier publishing Company, 1973.

Economic Criteria of Mining processing Operations.[9]

Environmental management in mineral processing industries [].

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