

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2022****Subject Code:3152107****Date:06-01-2023****Subject Name:Non Ferrous Extractive Metallurgy****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Enlist the Aluminum, Zinc and copper industries in India.	03
	(b) Classify unit processes/operations based on method of extraction.	04
	(c) Enlist various reactors used in extraction of metals. Explain working principle fluidized bed reactor in detail.	07
Q.2	(a) Define extractive metallurgy & enlist types of ores with examples.	03
	(b) Differentiate between Pyrometallurgy and Hydrometallurgy.	04
	(c) Draw and explain Ellingham diagram in detail.	07
OR		
	(c) Explain Percolation leaching process. Enlist advantages and limitations of percolation leaching.	07
Q.3	(a) What is Roasting in pyro metallurgy?	03
	(b) Draw and explain predominance area diagram.	04
	(c) Write a short note on solvent extraction process in hydrometallurgy.	07
OR		
Q.3	(a) What is reaction rate? Enlist factors affecting reaction rate.	03
	(b) What is Rate law? Write down formula for rate law of first and second order reactions.	04
	(c) What is half-life of a reaction? Derive formula for half-life of a first order reaction and a second order reaction.	07
Q.4	(a) Mention the Role of Cryolite in Electrolysis of Al.	03
	(b) Enlist advantages and limitations of pyro metallurgical processes.	04
	(c) Explain bacterial leaching with its advantages and limitations.	07
OR		
Q.4	(a) List out ores of Aluminum with chemical formulae. Enlist applications of Al.	03
	(b) Draw a flow sheet of Alumina refining.	04
	(c) Explain Matte smelting and Flash smelting operations.	07
Q.5	(a) List out sources of Nickel with chemical formula and list out applications of Ni.	03
	(b) Draw a flow sheet for refining of Lead bullion.	04
	(c) Explain Mitsubishi process for copper smelting.	07
OR		
Q.5	(a) List out ores of Titanium (Ti) with chemical formula. Give applications of Ti.	03
	(b) Enlist ores of Lead and its applications in engineering fields.	04

(c) Draw and explain a flow sheet of extraction of Zinc by pyro metallurgical process. **07**
