Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – IV • EXAMINATION – WINTER 2012

Subject code: 142102 **Date: 28/12/2012**

Subject Name: Principles of Extractive Metallurgy

Time: 02.30 pm - 05.00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Define and explain: 1. Calcination 2. Pelletizing 3. Converting	**07**
	(b)	What are Ellingham diagrams? Explain how Ellingham diagrams can be useful in the extractive metallurgical process.	**07**
Q.2	**(a)**	Discuss different steps of fluidized bed roasting process. Mention the importance of Fluidization curve.	**07**
	(b)	Draw process flow sheet of Aluminum extraction. Label all important process parameters.	**07**
		OR	
	(b)	Write a note on sulphide free energy diagram and their limitations.	**07**
Q.3	**(a)**	"Blast furnace smelting is not used for extraction of copper, whereas blast furnace smelting is extensively used for extraction of iron." Examine the statement critically and justify.	**07**
	(b)	Explain the Solvent extraction process.	**07**
		OR	
Q.3	**(a)**	Draw a neat flow sheet for extraction of 99.9% pure copper from its common ore using pyrometallurgical route.	**07**
	(b)	Describe about microbial leaching. Explain the effect of bacteria on leaching rate and extent of recovery.	**07**
Q.4	**(a)**	Define hydrometallurgy. Mention the advantages and limitations of of Hydrometallurgical extraction processes.	**07**
	(b)	Write a note on Electrowinning. Discuss its applications.	**07**
		OR	
Q.4	**(a)**	Define pressure leaching. Discuss the requirements of pressure leaching. Why pressure leaching is carried out in autoclave?	**07**
Q.4	**(b)**	Discuss the electrochemical principle involved in electrorefining of metals using molten salts. Explain the principle in reference to refining of aluminum.	**07**
Q.5	**(a)**	Draw process flow sheet of Zinc extraction with important parameters involved in the process.	**07**
	(b)	What do you mean by reaction rate? Discuss various factors affecting rate of a reaction.	**07**
		OR	
Q.5	**(a)**	What are flux and slag? List the properties and function of a flux and slag in smelting process.	**07**
	(b)	Discuss collision theory of reaction kinetics.	**07**

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