GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. Sem-IV Examination June- 2010
Subject code: 142102
Subject Name: Principles of Extractive Metallurgy

Date:18 / 06 /2010   Time: 10.30 am – 01.00 pm

Instructions: Total Marks: 70

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

Q.1	**(a)**	1. Name various sources of metals and define ore and mineral.	**03**
		2. What is calcination? What is the equipment needed for calcination?	**02**
		3. What are Faraday's laws of electrolysis?	**02**
	(b)	"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**

Q.2	**(a)**	Draw a neat flow sheet for extraction of 99.9% pure copper from its common ore using pyrometallurgical route.	**07**
	(b)	Explain the following:	
		i) Ion Exchange and Solvent Extraction process	**04**
		ii) Zone refining	**03**

OR

	(b)	Justify the importance of Ellingham diagram for oxide system in extractive metallurgy using pyrometallurgical route.	**07**

Q.3	**(a)**	Why fused salt electrolysis is carried out for extraction of aluminum? Explain the process clearly with suitable diagram.	**07**
	(b)	What do you mean by order of a reaction? Is it possible to find out the order of reaction by thermodynamic principle or law?	**07**

OR

Q.3	**(a)**	Explain the arrangement of electrodes in electrolytic cell containing aqueous electrolytes. Bring out their merits and demerits.	**07**
	(b)	Differentiate between electro winning and electro refining.	**07**

Q.4	**(a)**	What do you mean by leaching? Explain bacterial leaching and the factors affecting it.	**07**
	(b)	Draw the flow sheet for iron extraction and manufacturing of steel.	**07**

OR

Q.4	**(a)**	Explain different pyrometallurgical processes and differentiate between melting and smelting.	**07**
	(b)	Differentiate between homogenous and heterogeneous reaction.	**07**

Q.5	**(a)**	What do you mean by rate of a reaction? Discuss various factors affecting rate of a reaction.	**07**
	(b)	Write all possible rate equation in terms of each of the reactant and product of the following reaction	**07**

$$A + 2B \rightarrow 3C + D + 2E$$

OR

Q.5	**(a)**	Derive equation for half life period of first order reaction.	**07**
	(b)	Discuss collision theory of reaction kinetics.	**07**

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