Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2142102 **Date: 06/06/2017**

Subject Name: Principles of 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Define Extractive Metallurgy.	
	2	Define Calcination.	
	3	What is Pelletizing?	
	4	Define Roasting.	
	5	Define Refining.	
	6	Define Converting.	
	7	Define Leaching.	
	8	Define Smelting.	
	9	Define Pyrometallurgy.	
	10	Purpose of roasting in the extraction of Copper is_____.	
	11	Matte is_____.	
	12	Silicate degree of basic slag is_____.	
	13	In _____ Process, higher grades of ore are leached using dumps.	
	14	In _____Process, a more reactive metal dissolves in a solution to precipitate less reactive metal from solution.	
Q.2	**(a)**	Explain the electrolytic refining.	**03**
	(b)	Describe the basic concept of electrometallurgy.	**04**
	(c)	Compare pyrometallurgy and hydrometallurgy in terms of advantages and limitations.	**07**
		OR	
	(c)	Draw process flow sheet of Copper extraction. Label all important parameters involved in the process.	**07**
Q.3	**(a)**	List the properties and function of flux in smelting process.	**03**
	(b)	Differentiate between Matte smelting and Reduction smelting.	**04**
	(c)	Explain importance of oxide free energy diagram in pyrometallurgy. Write limitations of Ellingham diagrams.	**07**
		OR	
Q.3	**(a)**	List the properties and function of slag in smelting process.	**03**
	(b)	Discuss about Multiple Hearth roaster.	**04**
	(c)	Discuss different steps of fluidized bed roasting process. Mention the importance of Fluidization curve.	**07**
Q.4	**(a)**	What is percolation leaching? List out advantage of it.	**03**
	(b)	Explain the role of oxygen in leaching operations.	**04**
	(c)	Describe the microbial leaching. Explain the effect of bacteria on leaching rate and extent of recovery.	**07**
		OR	
Q.4	**(a)**	Explain the reason of using autoclave in pressure leaching.	**03**

	(b)	Explain the criteria for selection of a leaching reagent.	**04**
	(c)	Write a note on Solvent extraction process.	**07**
Q.5	**(a)**	Derive Arrhenius Equation.	**03**
	(b)	Differentiate between Order of reactions and Molecularity.	**04**
	(c)	Derive equation for half-life period of first order reaction.	**07**

OR

Q.5	**(a)**	Explain the Zone refining.	**03**
	(b)	Discuss factors affecting velocity of a reaction.	**04**
	(c)	Explain Collision Theory of reaction kinetics.	**07**

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