

**GUJARAT TECHNOLOGICAL UNIVERSITY**
**BE - SEMESTER-IV(NEW) – EXAMINATION – SUMMER 2019**
**Subject Code:2142102**
**Date:17/05/2019**
**Subject Name: Principles of Extractive Metallurgy**
**Time:02:30 PM TO 05:00 PM**
**Total Marks: 70**
**Instructions:**

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

		<b>MARKS</b>
<b>Q.1</b>	(a) Define:	<b>03</b>
	1) Calcination,	
	2) Pelletizing,	
	3) Current Density.	
	(b) What is extractive metallurgy? Give basic flow diagram of extractive metallurgy.	<b>04</b>
	(c) Define pyrometallurgy. Describe different advantages & limitations of pyrometallurgical extraction process.	<b>07</b>
<b>Q.2</b>	(a) Multiple Choice Questions:	<b>03</b>
	1) Kinks signify,	
	a. the point of change in entropy in Ellingham diagram	
	b. the point of phase changes in Ellingham diagram	
	c. the point at which the gradient of line changes in Ellingham diagram	
	d. all of the above	
	2) The process of calcinations and roasting are carried out in,	
	a. Blast furnace	
	b. Muffle furnace	
	c. Reverberatory furnace	
	d. Open hearth furnace	
	3) Which of the following is obtained by hydrometallurgy: Cu, Au, Ag?	
	a. Cu only	
	b. Au and Cu only	
	c. Ag and Au only	
	d. All three	
	(b) Draw flow sheet for production of Iron and Steel.	<b>04</b>
	(c) Explain importance of oxide free energy diagram in pyrometallurgy. Write the limitations of Ellingham diagrams.	<b>07</b>
	<b>OR</b>	
	(c) Describe the microbial leaching. Explain the effect of bacteria on leaching rate and extent of recovery.	<b>07</b>
<b>Q.3</b>	(a) List the properties and function of flux in smelting process.	<b>03</b>
	(b) Explain flash smelting process.	<b>04</b>
	(c) What is roasting? Explain fluidized bed roasting process in brief.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) What is percolation leaching? List its advantages.	<b>03</b>
	(b) Write in detail about ion exchange process.	<b>04</b>

- (c) Define leaching. Explain the pressure leaching process. Why is it carried out in autoclave? **07**
- Q.4** (a) Describe the basic concept of electrometallurgy. **03**  
(b) Differentiate between electro-winning and electrorefining. **04**  
(c) Explain the process of fused salt electrolysis with suitable example. **07**
- OR**
- Q.4** (a) Draw flow sheet for production of Lead. **03**  
(b) Draw flow sheet of extraction of Zinc. **04**  
(c) Draw process flow sheet of Copper extraction. Label all important parameters involved in the process. **07**
- Q.5** (a) Explain zone refining. **03**  
(b) Discuss factors affecting velocity of a reaction. **04**  
(c) Discuss collision theory of reaction kinetics. **07**
- OR**
- Q.5** (a) Explain theory of absolute reaction rate. **03**  
(b) Derive Arrhenius equation. **04**  
(c) What is order of reactions and molecularity? Differentiate between order and molecularity. **07**

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