

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.

| | MARKS |
|---|--------------|
| Q.1 (a) Define: | 03 |
| 1) Calcination, | |
| 2) Pelletizing, | |
| 3) Current Density. | |
| (b) What is extractive metallurgy? Give basic flow diagram of extractive metallurgy. | 04 |
| (c) Define pyrometallurgy. Describe different advantages & limitations of pyrometallurgical extraction process. | 07 |
| Q.2 (a) Multiple Choice Questions: | 03 |
| 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. | 04 |
| (c) Explain importance of oxide free energy diagram in pyrometallurgy. Write the limitations of Ellingham diagrams. | 07 |
| OR | |
| (c) Describe the microbial leaching. Explain the effect of bacteria on leaching rate and extent of recovery. | 07 |
| Q.3 (a) List the properties and function of flux in smelting process. | 03 |
| (b) Explain flash smelting process. | 04 |
| (c) What is roasting? Explain fluidized bed roasting process in brief. | 07 |
| OR | |
| Q.3 (a) What is percolation leaching? List its advantages. | 03 |
| (b) Write in detail about ion exchange process. | 04 |

- (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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