

**B.E Metallurgical Engineering, Third Year Second Semester  
Supplementary Examination 2023**

**Subject: Extraction of Non-Ferrous Metals**

**Time:** Three Hours

**Full marks:** 100

**(Answer any five from the following questions)**

1. (a) State the advantages and disadvantages of hydrometallurgical process of metal extraction. 5
- (b) Name the ores and chemical formulae from which the following metals are extracted:  
(i) Nickel; (ii) Titanium; (iii) Zinc; (iv) Tungsten (v) Lead 5
- (c) Give a complete flow sheet for extraction of Aluminium. 10
2. (a) With examples discuss the difference between “electro-refining” and “electro-winning” processes. 5
- (b) With example find the theoretical cell voltage requirement for “electro-refining” process. Whether this theoretical cell voltage is sufficient for the “electro-refining” process. Give reasons in support of your answer. 5
- (c) Describe the complete process for extraction of zinc from its ores. 10
3. (a) Write short notes on – (i) Red Mud; (ii) Anode effect; and (iii) Cementation process.  $5 \times 3 = 15$
- (b) Why aluminium is not extracted by carbothermic reduction process? 5
4. (a) What is the purpose of Roasting in case of extraction process of copper from sulphide ore? 5
- (b) Discuss with one example the predominance area diagram and its usefulness. 10
- (c) Discuss the refining processes of ‘blister copper.’ 5
5. (a) How would you know the rate controlling process in case of leaching of an ore? 5
- (b) Name the ore for extraction of Uranium. Discuss Uranium extraction process through solvent extraction route. 15
6. (a) After giving all the relevant reactions describe the process for extraction of gold from its ore. 12
- (b) Write a short note on “pidgeon process” with all relevant reactions 8
7. (a) Discuss the Titanium extraction process from its ore. What is the name of the end product?
- (b) Name the process for extraction of Nickel from its ore and discuss the process for Nickel extraction. 10 + 10 = 20