

Code No: 09A51802

R09

Set No. 2

III B.Tech I Semester Examinations, December 2011
NONFERROUS EXTRACTIVE METALLURGY
Metallurgy And Material Technology

Time: 3 hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. Explain about the following:
 - (a) Smelting of nickel concentrates
 - (b) Differentiate between cementation and calcinations
 - (c) Differentiate between carbonization process and carbothermic reduction. [5+5+5]
2. (a) What are the different stages in converting matte to blister copper? Explain with relevant equations.
- (b) Critically discuss the difference between Zinc blast furnace and Copper blast furnace. [7+8]
3. With the help of a neat sketch of the Hall-Heroalt cell describe its operation in detail and give the complete cell data. [15]
4. Explain about the following:
 - (a) Hansgrig process
 - (b) DOW process. [7+8]
5. Explain about the following
 - (a) Lead refining (In kettles)
 - (b) Production of lead in India. [15]
6. (a) Give an account of the use of chlorine in the extractive metallurgy of reactive metals. How it is used in titanium production?
- (b) Discusses the significant contribution of Hunter process and what are the factors which will effect this process. [8+7]
7. Briefly discuss the following
 - (a) Chemical beneficiation of Uranium ores.
 - (b) Refining of Uranium. [8+7]
8. What are the harmful impurities in electrical grade Zinc and how are they eliminated during Zinc electro refining? [15]

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1. (a) Discuss the chemistry of flash smelting with suitable examples.
(b) Differentiate between matte smelting and reduction smelting. [7+8]
2. Explain the production of Nickel from oxide ore by pyrometallurgical route (with flow sheet). [15]
3. List out the important ores/minerals, properties, sources and Industries in India of magnesium metal. [15]
4. Explain about the following
 - (a) Parke's process
 - (b) How the problems associated with the condensation of lead vapours are overcome? [7+8]
5. List out the various methods used for recovery of uranium from solution and explain any one method from them. [15]
6. With a neat figure explain the Kroll's process. [15]
7. (a) Why Aluminium is not extracted by pyrometallurgy route only hydrometallurgy route give reasons?
(b) Explain the role of cryolite in electrolysis of aluminium extraction. [7+8]
8. List out the following:
 - (a) Physical properties of Zinc
 - (b) Uses of Zinc
 - (c) Zinc industries in India
 - (d) Sources of Zinc. [4+4+4+3]

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1. (a) Why in Uranium extraction vacuum Refining is used?
(b) Why chemical beneficiation is used in uranium ore upgradation?
(c) Why solvent extraction/Iron exchange are used as purification techniques in uranium extraction?
(d) What are the specific requirements needed for reactor grade uranium extraction? [4+4+4+3]
2. With a neat flow sheet explain the production of titanium from Ilmenite ore. [15]
3. Discuss in detail about the production of hydrous magnesium chloride from
(a) Sea water
(b) Magnesite. [15]
4. (a) Explain the basic principle involved in the extraction of lead from galena mineral.
(b) Critically discuss the difference between lead blast furnace with iron blast furnace. [8+7]
5. Draw neatly the electrolytic reduction cell used for refining of Aluminium and also give the cell details & cell operation. [15]
6. Differentiate between
(a) The amalgamation process and cyanidation process.
(b) The chlorination process and the amalgamation process. [8+7]
7. Differentiate between:
(a) Horizontal retort and vertical retort reduction process
(b) Electro refining and fire refining
(c) Zinc blast furnace and iron blast furnace. [5+5+5]
8. (a) Explain in detail about the leaching process which is used for copper production.
(b) What are the pre requisites for the selection of an effective reagent for leaching and list out the methods used for the recovery of metallic values for the leach solution? [8+7]

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1. Define the following
 - (a) Refining
 - (b) Mineral
 - (c) Smelting
 - (d) Roasting
 - (e) Sintering
 - (f) Lead bullion
 - (g) Scrap
 - (h) Slag. [15]
2. (a) Why in tungsten production both “pyro” and “Hydro” metallurgical extraction is included?
(b) What are the important applications of tungsten ores? [8+7]
3. (a) Critically explain why matte smelting route is adopted for the extraction of copper.
(b) With the help of a flow sheet explain the production of blister copper from sulphide concentrates by pyrometallurgical route. [8+7]
4. (a) Taking any Zinc ore/mineral example, discuss the various steps involved in the hydrometallurgical treatment of ores.
(b) Discuss the various methods used for the recovery of metallic values from the leach solutions in Zinc production. [8+7]
5. Explain about the following:
 - (a) Chlorination of Titania.
 - (b) Refining of Ti from from $TiCl_4$ [7+8]
6. Why only solvent extraction is the purification technique used for purifying the uranium crude salt? [15]
7. With neat sketch explain the pidgeon process for production of magnesium metal. [15]
8. (a) Explain the various factors influencing on the electrolysis of alumina.

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Set No. 3

(b) Discuss various methods of treating low-grade ores of aluminium. [8+7]
