Subject: NON-FERROUS METALLURGY   [MT 603]

Full marks: 70   Time: 3 Hours

Answer Seven Questions

1.   Define the following terminologies with their applications in extraction of different metals: (any four)   [10]
   a.   Levigation
   b.   Froth floatation
   c.   Leaching
   d.   Cupellation
   e.   Roasting

2.   Define Red mud. How it is generated during extraction of aluminium? Describe aluminium extraction by Hall–Héroult process.   [10]

3.   What are the naturally occurring ores of Copper? Describe how Copper metal is extracted.   [10]

4.   Classify the following:
   a.   Copper and its alloys based on composition and temper designation.
   b.   Brass with different amount of Zinc.
   c.   Gun metal

5.   What are refractory metals? How does refractory metals fabricated although they have high melting point? How is tungsten processed and fabricated?   [3+3+4]

6.   Illustrate different casting processes of Aluminium alloys. State with reasons the metallurgical factors that affect casting processes. Discuss the role of different particles in controlling the mechanical behaviour of Aluminium alloys.   [3+4+3]

7.   Name different strengthening mechanisms for aluminium and its alloys. AA 5xxx alloys are never recommended for automotive outer panels — justify. Why paint baking treatment is applied for AA 6xxx alloys? Define Thixo casting.   [2+3+3+2]

8.   Name different Ti alloys and their applications. Discuss the mechanism of β to ω transformation in Ti alloy. Discuss the role of alloying elements in Ti alloys. What are different heat treatment processes applied to Ti alloys.   [2+3+3+2]

9.   Give reasons:
   a.   Gold can be used for dental capping
   b.   Copper is used to prevent bio fouling.
   c.   Metalloids can have properties of both metals and nonmetals.
   d.   How does the history of the discovery of metals relate to chemistry?

10.   Mention different components of Pyrometallurgical unit operations. Differentiate electrowinning and electro refining.   [7+3]