

**IV B.Tech. II Semester Supplementary Examinations, July -2005**

**LIGHT METALS & ALLOYS**  
**(Metallurgy & Material Technology)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

\*\*\*\*\*

1. (a) What are the various methods used for treating of low-grade ores?  
(b) Explain AlCOA process with flow sheet.?
2. (a) Mention various methods used for the extraction of Beryllium.  
(b) Explain the extraction of Beryllium by lime sinter process.
3. (a) What type of alloys are included under the general heading, light alloys?  
(b) What alloying elements are commonly used and what is the effect of alloying elements in the commercial aluminum alloys?
4. Draw and explain the modified Al-Si phase diagram with neat microstructures at different phase regions.
5. Discuss the various joining methods used for Magnesium and its alloys.
6. What are the effects of alloying elements and impurities on the mechanical properties of Titanium? Explain with neat diagram.
7. (a) Explain the strengthening mechanism of precipitation-hardened materials.  
(b) What are the differences between precipitation hardening and dispersion strengthening? Explain with suitable examples.
8. (a) Critically discuss the heat treatment of Aluminum Copper alloys.  
(b) Explain the heat treatment of cast Aluminum alloys.

\*\*\*\*\*

**IV B.Tech. II Semester Supplementary Examinations, July -2005**

**LIGHT METALS & ALLOYS**  
**(Metallurgy & Material Technology)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

\*\*\*\*\*

1. (a) List the most common minerals of Aluminum and mention the chief impurities present.  
(b) What is the effect of Silica in extraction of Aluminum?
2. (a) Discuss the properties and applications of Beryllium?  
(b) i. Mention the important sources of Beryllium.  
ii. Explain the extraction of Beryllium by Fluoride process with neat flow diagram.
3. (a) What type of alloys are included under the general heading, light alloys?  
(b) What alloying elements are commonly used and what is the effect of alloying elements in the commercial aluminum alloys?
4. (a) Discuss the physical metallurgy of Al-Li alloys.  
(b) What are the properties and applications of Al-Li alloys?
5. (a) Explain the physical, mechanical properties of magnesium and its alloys.  
(b) Discuss the advantages and applications of magnesium alloys in engineering industries.
6. (a) Give the classification of Titanium alloys.  
(b) List the important  $\beta$  stabilizing elements and effect on mechanical properties of Titanium.  
(c) Discuss the properties and applications of Titanium  $\alpha$  alloys.
7. Define the following terms:  
(a) Solutionizing  
(b) Quenching  
(c) Precipitation hardening  
(d) Aging
8. (a) Discuss the precipitation hardening of Mg-Zn based alloys.  
(b) Explain the heat treatment of Mg-Thorium based alloys.

\*\*\*\*\*

**IV B.Tech. II Semester Supplementary Examinations, July -2005**

**LIGHT METALS & ALLOYS**  
**(Metallurgy & Material Technology)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

\*\*\*\*\*

1. Explain the electrolytic decomposition of Alumina by Hall-Heroult process.
2. (a) Mention the important sources of Beryllium.  
(b) Discuss the extraction of Beryllium by sulphate process.
3. (a) What type of alloys are included under the general heading, light alloys?  
(b) What alloying elements are commonly used and what is the effect of alloying elements in the commercial aluminum alloys?
4. (a) Draw the phase diagram of Al-Si and label all the phases present in it.  
(b) Why eutectic alloys are more preferable for casting than others?  
(c) What are the advantages of Si in Aluminum?
5. (a) Draw the equilibrium diagram of Mg-Zn and label all the phases present in it.  
(b) Explain how Zinc shows the most potent precipitation hardening effects of Magnesium based alloys.
6. What are the effects of alloying elements and impurities on the mechanical properties of Titanium? Explain with neat diagram.
7. Define the following terms:
  - (a) Solutionizing
  - (b) Quenching
  - (c) Precipitation hardening
  - (d) Aging
8. (a) Discuss the precipitation hardening of Mg-Zn based alloys.  
(b) Explain the heat treatment of Mg-Thorium based alloys.

\*\*\*\*\*

**IV B.Tech. II Semester Supplementary Examinations, July -2005**

**LIGHT METALS & ALLOYS**  
**(Metallurgy & Material Technology)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

\*\*\*\*\*

1. (a) List the most common minerals of Aluminum and mention the chief impurities present.  
(b) What is the effect of Silica in extraction of Aluminum?
2. (a) Mention the important sources of Beryllium.  
(b) Discuss the extraction of Beryllium by sulphate process.
3. (a) Draw the Aluminum-copper phase diagram and label all the phases present in it.  
(b) Explain the Heat treatment of Al-4.5 % Cu alloys.
4. (a) Draw the Al-Mg equilibrium diagram and label the phases present in it.  
(b) Explain the effects of Magnesium content on the mechanical properties of Al-Mg alloys.  
(c) Why Al-Mg alloys are non-heat treatable?
5. (a) What is mischmetal? Give its chemical composition.  
(b) Discuss the properties and applications of magnesium-Rare-Earth-based alloys.  
(c) Thorium improves the elevated temperature properties of magnesium. Justify the statement.
6. (a) Explain the physical and mechanical properties and allotropic transformation of Titanium.  
(b) Explain the oxidation and corrosion behaviour of Titanium and its alloys.
7. (a) Explain the heat treatment of Titanium ( $\alpha+\beta$ ) alloys.  
(b) What is the effect of Aluminum in Titanium alloys? Explain.
8. Discuss the precipitation hardening and strengthening mechanism of precipitation hardening with suitable example.

\*\*\*\*\*