

**IV B.Tech. II Semester Regular Examinations, April/May -2005**

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

**Time: 3 hours**

**Max Marks: 80**

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

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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) Describe various advantages and applications of Aluminum and its alloys.  
(b) Discuss the classification of Aluminum alloys suggested by Aluminum association company.  
(c) Explain the standard temper designation of 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. (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) Discuss the heat treatment of Aluminum-4.5% Cu alloy.  
(b) What is precipitation hardening? What are the conditions required for precipitation hardening to take place in any alloy?
8. Discuss the precipitation hardening and strengthening mechanism of precipitation hardening with suitable example.

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1. Explain the electrolytic decomposition of Alumina by Hall-Heroult process.
2. (a) Discuss the properties that make Beryllium particularly interesting engineering material?  
(b) Discuss the manufacturing techniques used for Beryllium alloys?
3. Explain the strengthening mechanisms of precipitation hardening.
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) Explain the physical, mechanical properties of magnesium and its alloys.  
(b) Discuss the advantages and applications of magnesium alloys in engineering industries.
6. (a) Draw the Ti-Mn phase diagram and label all the phases present in it.  
(b) What is the effect of Mn in Titanium alloys?
7. (a) What are the effects of lithium in Aluminum alloys?  
(b) Explain the precipitation hardening of Aluminum-Li alloys.
8. Discuss the precipitation hardening and strengthening mechanism of precipitation hardening with suitable example.

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(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) 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 the effect of Zirconium in Magnesium-Zinc alloys?  
(b) Discuss the mechanical behaviour of Magnesium alloys.  
(c) Discuss the corrosion behaviour of Magnesium alloys.
6. (a) Discuss the applications of Titanium P/M products.  
(b) Explain the mechanical and physical properties of Titanium P/M products.
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. Discuss the precipitation hardening and strengthening mechanism of precipitation hardening with suitable example.

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(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) 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) Explain the Al-Si-Mg alloys with phase diagram.  
(b) How Magnesium silicide improves the mechanical properties of Aluminum alloys?
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. (a) Discuss the heat treatment of Aluminum-4.5% Cu alloy.  
(b) What is precipitation hardening? What are the conditions required for precipitation hardening to take place in any alloy?
8. Discuss the precipitation hardening and strengthening mechanism of precipitation hardening with suitable example.

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