

IV B.Tech I Semester Regular Examinations, November 2005

LIGHT METALS & ALLOYS
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What is synthetic cryolite? How it has been produced? Explain with neat flow sheet. [16]
2. (a) Discuss the properties and applications of Beryllium? [6]
(b) i. Mention the important sources of Beryllium.
ii. Explain the extraction of Beryllium by Fluoride process with neat flow diagram. [3+7]
3. Explain the following terms:
(a) Solutionizing
(b) Super saturated solid solution
(c) Precipitation hardening
(d) Natural aging
(e) Artificial aging [3+3+4+3+3]
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? [7+5+4]
5. (a) Explain the physical, mechanical properties of magnesium and its alloys.
(b) Discuss the advantages and applications of magnesium alloys in engineering industries. [8+8]
6. What are the effects of alloying elements and impurities on the mechanical properties of Titanium? Explain with neat diagram. [16]
7. Define the following terms:
(a) Solutionizing
(b) Quenching
(c) Precipitation hardening
(d) Aging [4x4]
8. (a) Critically discuss the heat treatment of Aluminum Copper alloys.

(b) Explain the heat treatment of cast Aluminum alloys.

[8+8]

IV B.Tech I Semester Regular Examinations, November 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? [9+7]
2. (a) Mention the important sources of Beryllium.
(b) Discuss the extraction of Beryllium by sulphate process. [6+10]
3. (a) Explain the various microstructural changes that take place when an Al-4.5 % Cu alloys subjected to solution treatment, quenching and aged at 130°C.
(b) Explain the precipitation hardening mechanisms by coherent precipitates. [8+8]
4. (a) Explain the classification of Aluminum casting alloys.
(b) Discuss the fabrication characteristics of Aluminum alloys. [7+9]
5. (a) Explain the physical, mechanical properties of magnesium and its alloys.
(b) Discuss the advantages and applications of magnesium alloys in engineering industries. [8+8]
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? [9+7]
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? [6+10]
8. (a) Critically explain the heat treatment of Aluminum-lithium alloys.
(b) Explain the heat treatment of Mg-Aluminum based sand casting alloys. [8+8]

IV B.Tech I Semester Regular Examinations, November 2005

LIGHT METALS & ALLOYS
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What are effects of various factors on the efficiency of the Bayer process? [16]
2. (a) Draw the Beryllium-copper phase diagram and label all the phases present in it.
(b) Discuss the precipitation hardening of copper-Beryllium alloys. [8+8]
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? [5+11]
4. Write short notes on the following for Aluminum alloys:
 - (a) Solid solution strengthening
 - (b) Strengthening from second phase constituents
 - (c) Grain refinement with dispersed precipitates
 - (d) Strain hardening [4x4]
5. (a) Explain the physical, mechanical properties of magnesium and its alloys.
(b) Discuss the advantages and applications of magnesium alloys in engineering industries. [8+8]
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? [9+7]
7. Why Aluminum-12% Si alloys are not heat treatable? Explain with phase equilibrium diagrams. [16]
8. (a) Discuss the heat treatment and microstructure of B-Titanium alloys.
(b) Discuss the heat treatment of Beryllium alloys. [8+8]

IV B.Tech I Semester Regular Examinations, November 2005

LIGHT METALS & ALLOYS
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What are effects of various factors on the efficiency of the Bayer process? [16]
2. (a) Discuss the properties that make Beryllium particularly interesting engineering material?
(b) Discuss the manufacturing techniques used for Beryllium alloys? [7+9]
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? [5+11]
4. How Silumins (Al-Si) are modified, explain with phase diagram and microstructures. [16]
5. (a) Explain the physical, mechanical properties of magnesium and its alloys.
(b) Discuss the advantages and applications of magnesium alloys in engineering industries. [8+8]
6. Classify the alloying elements of Titanium and discuss the role of
 - (a) Alpha stabilizers
 - (b) Beta stabilizers
 - (c) The isomorphous group
 - (d) The eutectoid forming group [4x4]
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? [6+10]
8. Discuss the precipitation hardening and strengthening mechanism of precipitation hardening with suitable example. [16]
