Code No: 07A70608 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,NOVEMBER 2010
LIGHT METALS AND ALLOYS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the various advantages of hydro metallurgy.
   (b) Write a short note on various leaching techniques. [8+8]
2. Discuss briefly about Mg - Al casting alloys and their mechanical properties. [16]
3. Explain the pyrometallurgical method of extraction of zirconium from its minerals. [16]
4. Write a note on properties and applications of Al-Li alloys. [16]
5. (a) What do you mean by AZ92A? Discuss.
   (b) Explain the microstructural changes AZ92A sand casting alloy during solidification and heat treatment. [8+8]
6. Explain in detail, how Al_2O_3 and Fe can be removed from Beryl ore leachant in Lime Sinter process. [16]
7. Prove thermodynamically the below given reactions of conversion of chlorine to tetrachloride during indirect chlorinate of TiO_2 at 1020 ^{0}C [16]

   $TiO_{2(g)} + 2Cl_{2(g)} = TiCl_{4(g)} + O_2$.
8. (a) How do the interstitial elements affect mechanical properties of commercially pure titanium?
   (b) Why is 0.2 % Pd added to titanium? What is 'E L 1' commercially pure titanium? What are its special applications? [6+10]

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Code No: 07A70608 **R07** **Set No. 4**

IV B.Tech I Semester Examinations,NOVEMBER 2010
LIGHT METALS AND ALLOYS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. List out the various unit operations to be performed in mineral dressing. [16]
2. (a) Give the details of world wide distribution of Titanium ores.
   (b) Write a short note on acid leaching of Ilmenite. [6+10]
3. (a) What are the properties of Zinc? Why can not pure Zinc be strain hardened significantly at room temperature?
   (b) Give a brief applications of Zinc and its alloys. [8+8]
4. Discuss in detail about the Lime sinter process for Beryl treatment. [16]
5. What are inhibitors? What are their mechanisms to prevent corrosion? [16]
6. (a) Compare the melting points, densities, crystal structures of Magnesium, Aluminum and Iron.
   (b) Why are Magnesium alloys difficult to plastically deform at room temperature?
   (c) Give a classification of Magnesium alloys. [5+5+6]
7. (a) What principal micro structural change occurs when α - titanium martensite is tempered at 500 ^{0}C?
   (b) How is acicular α produced in Ti - 6%Al - 4%V? What is the mechanism of formation?
   (c) What types of microstructures are formed when Ti - 6%Al - 4%V alloy is cooled from 1066 ^{0}C in the following ways:
      i. Furnace cooling
      ii. Air cooling
      iii. Water quenching. [5+5+6]
8. Explain why Hafium is removed from zirconium for use in nuclear reactors. Explain the process of removal of Hafium from zirconium in detail. [16]

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Code No: 07A70608 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,NOVEMBER 2010
LIGHT METALS AND ALLOYS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Discuss about:
   (a) Melting of Magnesium alloys
   (b) Die casting of Magnesium alloys. [8+8]
2. (a) Explain the corrosion behaviour of zinc compared to that of Al and Cr.
   (b) Compare the advantages and disadvantages of zinc with respect to other light metals and its alloys. [6+10]
3. With a neat flow sheet explain the treatment of low grade ores by hydro metallurgy route. [16]
4. (a) What are the sources of Zirconium? What are the other minerals associated with Zirconium minerals?
   (b) What is the general treatment given to Zircon?
   (c) What are the methods for separating Hafnium from Zirconium? [4+6+6]
5. (a) Compare and contrast the corrosion behavior of Al and Mg?
   (b) Discuss the important properties of Titanium. [8+8]
6. (a) What are the characteristics of Ti that makes it attractive for certain engineering applications?
   (b) How may α-β alloys can be strengthened. Discuss the properties and application of these alloys. [8+8]
7. (a) What are the main advantages and disadvantages of β - Ti alloy?
   (b) Why are β - Ti alloys mold cold formable than (α - β) Ti alloys?
   (c) Why do transformed or partly transformed structure in Titanium alloys have greater fracture toughness than equiaxed structures ? [6+5+5]
8. Write a short note on corrosion behavior of the following alloys:
   (a) Al-Si alloys
   (b) Al-Li alloys. [16]

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Code No: 07A70608 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,NOVEMBER 2010
LIGHT METALS AND ALLOYS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Write short notes on:
   (a) Precipitation hardening in Mg base binary alloys
   (b) Corrosion resistance of Mg base alloys. [8+8]
2. (a) Draw a graph to show the effect of ageing temperature of peak hardness of an alloy.
   (b) Draw a graph to show the effect of amount of solute on ageing curve. [8+8]
3. (a) Distinguish between a Mineral and Ore.
   (b) What is meant by a lean ore? Explain why lean grade ores are usually subjected to hydro metallurgical process for metal extraction. [6+10]
4. Explain in detail the theory of $TiCl_4$ reduction in Kroll's process. [16]
5. What elements and methods are there to improve the corrosion resistance of Mg and its alloys. Explain? [16]
6. (a) Explain about the following die casting zinc base alloys, with respect to
      i. Composition
      ii. Properties and
      iii. applications.
   (b) What is Calamine? Give its composition and chemical formula. What is the process by which the elemental metal is extracted. [12+4]
7. (a) Describe the properties and uses of zirconium.
   (b) Write a short notes on
      i. Zirconium and its alloys
      ii. BARNS
      iii. Neutron-capture. [8+8]
8. (a) What strengthening mechanisms are believed to be in the strengthening of Ti - 6%Al - 4%V alloy after solution heat treating at 954 ^{0}C and water quenching?
   (b) What strengthening mechanism is believed to cause the extra hardening after ageing a solution heated and quenched Ti - 6%Al - 4%V alloy 8 hours at 600 ^{0}C?
   (c) How is fracture toughness of Ti alloys greatly increased? [6+5+5]

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