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

IV B.Tech I Semester Examinations,MAY 2011
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 in detail about the nuclear and non nuclear applications of Beryllium. [16]
2. (a) What are the near α - Ti alloys? What are some of the principal applications of these alloys?
   (b) What is the advantage of duplex annealing the Ti - 8%Al - 1%Mo - 1%V alloy instead of using it in the nill annealed condition?
   (c) What are some of the important engineering properties of (α - β) Ti alloys? [6+5+5]
3. Write short notes on:
   (a) Precipitation hardening in Mg base binary alloys
   (b) Corrosion resistance of Mg base alloys. [8+8]
4. (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]
5. Write a short note on role of Titanium and its alloys in the field of :
   (a) Medical profession
   (b) Chemical industry. [16]
6. (a) Discuss in detail about factors influence on the electrolysis of Alumina.
   (b) The purity of metal produced by the Hall-Heroult Process seldom exceeds 99.5% - why? [8+8]
7. Write a short note on corrosion behavior of the following alloys:
   (a) Al-Si alloys
   (b) Al-Li alloys. [16]
8. With the help of a flow sheet discuss the production of nuclear grade zirconium sponge from pure zirconia. [16]

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

IV B.Tech I Semester Examinations,MAY 2011
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) What is the effect of zinc in magnesium alloy? Discuss.
   (b) What type of alloys are included under the general heading light alloys? Explain their physical and chemical properties. [6+10]
2. Draw the Cu - Be binary phase diagram, label all the phases, lines, and points and also write the reactions involved in it. [16]
3. Describe the eight forms of corrosion of metals. [16]
4. "Communition is the costliest and the least efficient operation in any mineral dressing process". Discuss this statement paying due attention to the relationship between the input of energy and the reduction in the particle size. [16]
5. (a) Describe briefly the Kroll's process for obtaining Ti sponge.
   (b) What are the precautions to be taken during reduction of TiO_2 in Kroll's process? [10+6]
6. Discuss about:
   (a) Grain refinement and
   (b) Sand casting of Magnesium alloys. [8+8]
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 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]

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

IV B.Tech I Semester Examinations,MAY 2011
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) Write a short note on Aluminium ores.
   (b) What is reductive roasting of an oxide concentrate? Discuss. [8+8]
2. What are the advantages and disadvantages of Magnesium alloys in engineering design? [16]
3. (a) Discuss about wrought Zinc alloys.
   (b) Discuss about Zinc alloys as structural materials. [8+8]
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. Discuss the removal of Alumina and Fe from Beryl ore leachant in Sulphate process. [16]
6. Write short notes on $(\alpha + \beta)$ Ti alloys. [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. Calculate the critical radius of copper when it freezes at 983 ^{0}C (freezing point of Cu = 1083 ^{0}C). Given the enthalpy of fusion of copper as 1.88 G J m^{-3} and the liquid - solid copper interfacial energy is 0.144 J m^{-2}. [16]

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

IV B.Tech I Semester Examinations,MAY 2011
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. Cu-Be alloys are strengthened by precipitation hardening - discuss in detail. [16]
2. Write short notes on:
   (a) Commercially pure Titanium
   (b) Effect of hydrogen and nitrogen on Titanium. [8+8]
3. Describe the various Al alloys used for chemical equipments. [16]
4. With a neat sketch explain the working procedure of three-layer process for Al refining. [16]
5. (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]
6. Discuss briefly about Mg - Al - Zn casting alloys. [16]
7. (a) What Zn - Al composition show high super plasticity?
   (b) What are the typical applications for Zinc casting alloys in engineering design?
   (c) What are some of major advantages of Zinc alloys in engineering design? [4+6+6]
8. (a) Explain why the halide process route is employed for the extraction of radioactive metals from their minerals.
   (b) Explain the physical ore beneficiation processes. [10+6]

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