III B.Tech I Semester Examinations,December 2011
MATERIAL SCIENCE FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours   Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Compare edge and screw dislocations.

   (b) Discuss the internal type of surface defects.   [8+8]

2. Explain the following:

   (a) Empirical laws of recrystallization

   (b) Grain growth

   (c) Super plastic behavior.   [5+5+6]

3. (a) Discuss how corrosion can be reduced by bringing environmental changes.

   (b) Explain half-cell reactions.   [10+6]

4. What do you understand by the charge cloud of an atomic electron? Account for the fact that while the cloud density of the 1s electron in the hydrogen atom is maximum in the immediate vicinity of the nucleus; the probability of finding the electron is maximum at a distance from the nucleus.   [16]

5. Explain the austempering process for a plain-carbon steel. Draw a cooling curve for an austempered austenitized eutectoid plain-carbon steel, using an isothermal transformation diagram.   [16]

6. Which crystal structures are most commonly found in metals? Compare their packing efficiencies in terms of coordination number and atomic packing factor.
                                                                        [16]

7. Describe Iron-Iron carbide phase diagram in detail.   [16]

8. (a) Determine the critical crack length for a through crack contained within a thick plate of aluminum alloy, which is under uniaxial tension. For this alloy $K_{IC} = \sqrt{in}$ 21ksi and $\sigma_f = 83$ ksi.

   (b) Discuss how the amount and arrangement of the glass fibers in fiberglass-reinforced plastics affect their strength.   [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

1

III B.Tech I Semester Examinations,December 2011
MATERIAL SCIENCE FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours   Max Marks: 80

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

1. Explain the following:

   (a) Empirical laws of recrystallization

   (b) Grain growth

   (c) Super plastic behavior.   [5+5+6]

2. (a) Determine the critical crack length for a through crack contained within a thick plate of aluminum alloy, which is under uniaxial tension. For this alloy $K_{IC} = \sqrt{in}$ 21ksi and $\sigma_f = 83$ ksi.

   (b) Discuss how the amount and arrangement of the glass fibers in fiberglass-reinforced plastics affect their strength.   [8+8]

3. Describe Iron-Iron carbide phase diagram in detail.   [16]

4. Which crystal structures are most commonly found in metals? Compare their packing efficiencies in terms of coordination number and atomic packing factor.
                                                                                 [16]

5. Explain the austempering process for a plain-carbon steel. Draw a cooling curve for an austempered austenitized eutectoid plain-carbon steel, using an isothermal transformation diagram.   [16]

6. (a) Discuss how corrosion can be reduced by bringing environmental changes.

   (b) Explain half-cell reactions.   [10+6]

7. What do you understand by the charge cloud of an atomic electron? Account for the fact that while the cloud density of the 1s electron in the hydrogen atom is maximum in the immediate vicinity of the nucleus; the probability of finding the electron is maximum at a distance from the nucleus.   [16]

8. (a) Compare edge and screw dislocations.

   (b) Discuss the internal type of surface defects.   [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

III B.Tech I Semester Examinations,December 2011
MATERIAL SCIENCE FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours   Max Marks: 80

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

1. Which crystal structures are most commonly found in metals? Compare their packing efficiencies in terms of coordination number and atomic packing factor.
[16]

2. (a) Determine the critical crack length for a through crack contained within a thick plate of aluminum alloy, which is under uniaxial tension. For this alloy $K_{IC} = \sqrt{in}$ 21ksi and $\sigma_f = 83$ ksi.

   (b) Discuss how the amount and arrangement of the glass fibers in fiberglass-reinforced plastics affect their strength.   [8+8]

3. What do you understand by the charge cloud of an atomic electron? Account for the fact that while the cloud density of the 1s electron in the hydrogen atom is maximum in the immediate vicinity of the nucleus; the probability of finding the electron is maximum at a distance from the nucleus.   [16]

4. (a) Discuss how corrosion can be reduced by bringing environmental changes.

   (b) Explain half-cell reactions.   [10+6]

5. Explain the following:

   (a) Empirical laws of recrystallization

   (b) Grain growth

   (c) Super plastic behavior.   [5+5+6]

6. (a) Compare edge and screw dislocations.

   (b) Discuss the internal type of surface defects.   [8+8]

7. Describe Iron-Iron carbide phase diagram in detail.   [16]

8. Explain the austempering process for a plain-carbon steel. Draw a cooling curve for an austempered austenitized eutectoid plain-carbon steel, using an isothermal transformation diagram.   [16]

⋆ ⋆ ⋆ ⋆ ⋆

III B.Tech I Semester Examinations,December 2011
MATERIAL SCIENCE FOR CHEMICAL ENGINEERS
Chemical Engineering

Time: 3 hours   Max Marks: 80

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

1. What do you understand by the charge cloud of an atomic electron? Account for the fact that while the cloud density of the 1s electron in the hydrogen atom is maximum in the immediate vicinity of the nucleus; the probability of finding the electron is maximum at a distance from the nucleus.   [16]

2. (a) Determine the critical crack length for a through crack contained within a thick plate of aluminum alloy, which is under uniaxial tension. For this alloy $K_{IC} = \sqrt{in}$ 21ksi and $\sigma_f = 83$ ksi.

   (b) Discuss how the amount and arrangement of the glass fibers in fiberglass-reinforced plastics affect their strength.   [8+8]

3. Explain the following:

   (a) Empirical laws of recrystallization

   (b) Grain growth

   (c) Super plastic behavior.   [5+5+6]

4. (a) Compare edge and screw dislocations.

   (b) Discuss the internal type of surface defects.   [8+8]

5. Describe Iron-Iron carbide phase diagram in detail.   [16]

6. Explain the austempering process for a plain-carbon steel. Draw a cooling curve for an austempered austenitized eutectoid plain-carbon steel, using an isothermal transformation diagram.   [16]

7. Which crystal structures are most commonly found in metals? Compare their packing efficiencies in terms of coordination number and atomic packing factor.   [16]

8. (a) Discuss how corrosion can be reduced by bringing environmental changes.

   (b) Explain half-cell reactions.   [10+6]

⋆ ⋆ ⋆ ⋆ ⋆