

IV B.Tech. I Semester Regular Examinations, November -2005**STEEL MAKING****(Metallurgy & Material Technology)****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Describe the sequence of elimination of impurities in a L.D. process with the help of a diagram? [6]
(b) Discuss the role played by emulsion-refining in L.D. process? How does it differ from bulk-refining? [6]
(c) What is mutual compound acceleration in refining by L.D. process? [4]
2. (a) What is refractory-material used for lining of Acid Open Hearth and Basic open hearth? [4]
(b) Distinguish between designs of acidic-roofs and basic roofs in open hearth furnace. [6]
(c) Why silicon is earlier considered a safe-refractory lining material for acid as well as basic roofs of open hearth furnace? [6]
3. (a) What is law of mass action? Explain it from a steel making-reaction point of view? [10]
(b) What is the Lechatelier-Principle? [3]
(c) For a chemical reaction $A + B \rightarrow C + D$, What is the equilibrium constant? [3]
4. (a) What is the most effective- dephosphoriser line, magnesium, manganese oxide, iron oxide. Arrange them in decreasing order of their dephosphorisation ability. [6]
(b) How does iron-oxide increase the dephosphorisation index? Why is there a maximum dephosphorisation index at around 15% FeO? [10]
5. (a) When is a open-hearth practice considered a hot-metal practice? [8]
(b) What practice needs to be followed to minimise scrap consumption in open hearths not provided with slag flushing facilities. [8]
6. Explain the following.
(a) Reducing single slag practice [2X8=16]
(b) Double slag practice
7. (a) What are the main aims of secondary steel making processes? [8]
(b) Categorise the various secondary steel making processes? [8]

8. Write a short notes on Hybrid-refining processes of steel?

[16]

IV B.Tech. I Semester Regular Examinations, November -2005**STEEL MAKING****(Metallurgy & Material Technology)****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Differentiate between an Acidic and a Basic Bessemer converter with respect to refractory lining, raw material, physical chemistry / exothermic reactions, slag-composition and converter-volume. [16]
2. (a) Compare Kaldo process with LD process of steel making. [8]
(b) How is the decarburisation possible in a Kaldo-converter? What are the various conditions responsible for an increased decarburisation-rate? [8]
3. (a) What is acid-steel making? How does it differ from basic-steel making? Explain slag-formation and its composition in each? [8]
(b) What is the nature of lining for acid process and basic process? Explain by taking any steel making process as an example. [8]
4. (a) What is external desiliconisation? [4]
(b) What happens if excess-silicon enters the basic steel making process? [4]
(c) Write the equilibrium constant for silicon-oxidation reaction? Explain its importance with respect to law of mass action. [8]
5. (a) Discuss as to how the slag control will be able to control the refining in acid-open hearth? [8]
(b) How can you assess the progress of refining during acid open-hearth process of steel making? [8]
6. (a) What are the different types of electric arc furnaces? What is the principle of each? [8]
(b) Which type of arc furnace is preferred for non-ferrous and which one for ferrous alloy production? [6]
(c) Why basic electric arc process is preferred over acid electric arc processes? [2]
7. Explain the effect of Carbon, Silicon and manganese on the steel-properties? [16]
8. Write a short notes on Hybrid-refining processes of steel? [16]

IV B.Tech. I Semester Regular Examinations, November -2005**STEEL MAKING****(Metallurgy & Material Technology)****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) How is L.D. process name come into existence? Discuss some of important characteristics of L.D. process? [6]
(b) Draw a neat - sketch of water-cooled lance showing O_2 -gas passage, water inlet and outlet. [6]
(c) What is the disadvantage of using a lance with a cylindrical - nozzle in L.D. process. [4]
2. (a) Differentiate between cementation process and Huntsman process of steel making. [10]
(b) What is the principle involved in the production of blister-steel? [6]
3. (a) Name the oxide products of silicon and phosphorous in steel making? What needs to be added to lesson the danger of backward-reaction of oxide-products? [8]
(b) Explain how both the above oxides get transferred to slag-phase? What is the slag-composition obtained for each? [8]
4. (a) What are the essential conditions for desulphurisation to take place? Explain with the help of 'S' - removal reaction? [8]
(b) Explain the difference between acid -processes and basic electric process with respect to desulphurisation? [8]
5. What is refractory lining of the following of basic open hearth process.
(a) Hearth [4x4=16]
(b) Walls
(c) Roof
(d) Posts, uptakes and slag pockets
6. (a) What is the principle of electric furnace steel making? [4]
(b) Give the formula for heat produced in any electrical circuit? [6]
(c) If a steel melts at temperature T, then find out the total heat required to melt M kgs of steel? [6]
Data :
Assume room-temperature = T_o

Specific heat of steel = S

Latent heat of fusion = L

7. (a) Describe the development of secondary steel making processes through the years? [8]
- (b) Explain the difference between primary steel making and secondary steel making? [8]
8. (a) Explain the Aston Byer's process of making wrought iron in detail? [8]
- (b) What are the properties of wrought iron and how does it differ from steel? [4]
- (c) Give some of applications of wrought iron? [4]

★ ★ ★ ★ ★

IV B.Tech. I Semester Regular Examinations, November -2005**STEEL MAKING****(Metallurgy & Material Technology)****Time: 3 hours****Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Discuss the role played by slag and emulsion for effective dephosphorisation in L.D. process. [6]
(b) How does dephosphorisation vary with respect to JFN? [4]
(c) Differentiate between L.D. process and Thomas process of steel making with reference to impurity - removal, blowing-period, tap-to-tap time, metallic yield etc. [6]
2. (a) Why should there be a need of intermediate slagging in LDAC process? [4]
(b) How does the final-slag composition differ from intermediate-slag composition? What is the use of each? [6]
(c) Discuss the similarities between LD and LDAC processes. [6]
3. Explain the mode of oxygen transfer from gas to metal via slag in hearth processes so as to form CO-bubbles at the refractory-bottom with the help of diagram. Also give the various reactions involved. [16]
4. (a) Why is gaseous-product of deoxidation considered ideal? Explain the concept of obtaining metal-cleanliness? [8]
(b) Explain the two different types of steel-deoxidation. [8]
5. (a) What are the major changes that are responsible for increase in production rate in a basic open hearth practice. [8]
(b) Explain the O_2 -lancing method of refining the basic-hot metal charge in a modern basic open hearth process. [8]
6. (a) How is the power consumed during melting, refining, deoxidation and alloying stages of an electric arc furnace? [8]
(b) List out the % consumption of total power input towards charge, electrical losses, water cooling losses and radiation losses. [8]
7. (a) Why is the secondary steel making termed as ladle-metallurgy? [10]
(b) Explain the duplexing process of secondary steel making. [6]
8. Write a Short notes on any two of following ancient processes of steel making.

[2X8=16]

- (a) Bloomery process

- (b) Puddling process
- (c) Finery process
- (d) Aston's Byer process

★ ★ ★ ★ ★