

Code No: 07A51803

R07**Set No. 2**

III B.Tech I Semester Examinations, May 2011

IRON PRODUCTION

Metallurgy And Material Technology

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What is low shaft blast furnace? Discuss the raw materials used, advantages and disadvantages of low shaft blast furnace. Explain with a neat sketch. [16]
2. (a) What are the raw materials used in Puddling process?
(b) Explain its advantages and disadvantages. [8+8]
3. Explain about the classification of iron ores based on geological origin. Also discuss each one of them in detail. [16]
4. What is hot blast stove? What are its important functions? Giving the constructional details and working of a hot blast stove. [16]
5. (a) What are the sources of sulphur in blast furnace iron production? Explain.
(b) Explain the chemistry of sulfur reactions in blast furnace. [8+8]
6. Write a brief note on various steps in starting up of a newly lined blast furnace. [16]
7. (a) What are the sources of phosphorous in blast furnace? Explain why is it not possible to remove phosphorous in blast furnace.
(b) Describe all the necessary chemical reduction reactions that lead to the CO-mixture of molten metal and slag. [8+8]
8. (a) What are the raw material requirements for studying ore efficiency of good quality sinter? Explain them fully.
(b) Explain the following with respect to control of sintering process.
 - i. Fuel content.
 - ii. Bed height.
 - iii. Moisture control. [10+6]

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Answer any FIVE Questions
All Questions carry equal marks

1. (a) Discuss how the Iron ores can be classified in detail.
(b) Write a brief note on iron ore deposits in the World. [10+6]
2. What are the methods of burden preparation of blast furnace? Explain the advantages of using sinters and pellets in Blast furnace. [16]
3. (a) Compare and contrast between wrought iron and pig iron.
(b) How wrought iron is made? Explain any one process of wrought iron production. [8+8]
4. Write short notes on the following:
(a) Blast furnace slag composition and Utilization.
(b) Primary slag, bosh slag and final slag. [8+8]
5. (a) Deduce the conditions for effective silicon transfer from metal and slag.
(b) What are the 4 zones in blast furnace, with reference to physical processes occurring in the furnace? Explain about them. [8+8]
6. An iron blast furnace produces pig iron of the following composition: Fe - 93.6%, Si - 2.1%, C - 3.6%, and Mn - 0.7%. The ore used analyzes as follows: Fe_2O_3 - 78%, SiO_2 - 9%, Al_2O_3 - 5%, MnO - 1% and H_2O - 7%. Assume that all the Fe_2O_3 is reduced to Fe. The coke is 90% C and 10% SiO_2 and 1 ton of coke is used per ton of pig iron made. The flux is pure CaCO_3 and enough is used to make a slag of 45% CaO. Calculate:
(a) The kilograms of ore used per ton of pig iron made.
(b) The percentage of the total SiO_2 and of the MnO reduced in the furnace.
(c) The weight of slag made per ton of pig iron, and its percentage composition. [16]
7. Explain the causes for the formation of following, its effects and its control:
(a) Chilled hearth.
(b) Choking of hearth. [8+8]
8. (a) Explain the physical and chemical properties that should be possessed by blast furnace charge material.

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- (b) What are the impurities that are associated with molten metal in blast furnace? What is the % weight of all these impurities before refining? How are they reduced to required minimum level in pig iron? [8+8]

FIRSTRANKER

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R07**Set No. 1**

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Metallurgy And Material Technology

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
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1. What were the early iron making furnaces? Describe them with neat labeled diagrams. [16]
2. (a) What is wrought iron? How is it different from pig iron?
(b) What are the various methods of making wrought iron? Discuss any one method. [8+8]
3. (a) Explain under what conditions of blast furnace burdening external desiliconisation is accomplished.
(b) Describe how the high temperature required for the reduction of iron ore is generated inside blast furnace. [10+6]
4. Explain the various factors that affect the rate of production of balls during sintering process. [16]
5. (a) Explain the importance of bosh slag.
(b) Explain the influence of iron in slag and that of slag volume and basicity. [8+8]
6. (a) Discuss about the fuels and reducing agents used in different processes of sponge iron making.
(b) Explain about various applications of sponge iron compared to pig iron. [8+8]
7. (a) Explain why the shape of the stack is chosen as frustrum of a cone.
(b) What are the various parts of blast furnace that are maintained on the top of the stack. Explain the working principle. [8+8]
8. Write short notes on the following:
(a) Hanging, types of hanging and its control.
(b) Slip formation, its effect and its control. [8+8]

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R07**Set No. 3**

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IRON PRODUCTION

Metallurgy And Material Technology

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the raw materials required for iron making? Explain.
(b) How can iron ores be classified based on structure and texture?
(c) Where are the deposits of iron ore found in India and around the world? [6+4+6]
2. (a) Discuss about the structure of the slags.
(b) Explain about electro-chemical nature of slag-metal reactions. [8+8]
3. (a) Explain the differences in production principles of wrought iron making and pig iron making.
(b) Explain the applications of wrought iron. [8+8]
4. (a) List out the advantages and disadvantages of low shaft furnace.
(b) Explain the operating principle of electric arc furnace. [8+8]
5. (a) Give a typical layout of modern blast furnace. Name the various parts in it.
(b) Explain the terms blowing in, blowing out and banking with references to blast furnace. [8+8]
6. (a) Explain on the equilibrium of H_2/H_2O ratio in contact with oxides of iron at various temperatures in a blast furnace.
(b) Explain the ill effects of sulphur and phosphorous on the properties of iron and steels. [10+6]
7. (a) Explain the factors that influence the rate of formation of balls in pelletization. Compare pelletization with Briquetting process.
(b) Explain the various layers of sintering bed a few minutes after the ignition of top layer. [8+8]
8. Explain the causes for the formation of following, its effects and its control:
 - (a) Burning of tuyeres.
 - (b) Coke-mess. [8+8]
