

**III B.Tech II Semester Supplementary Examinations,
November/December 2005
IRON PRODUCTION**

(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 80

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

1. (a) Explain how steel making came into existence in India. [8]
(b) Comment on the history of steel making in India. [8]
2. (a) What are the constituents of charge arrangements of a modern blast furnace? [8]
(b) What do you understand by uptake, down comer & bleeder value of blast furnace gas cleaning system? Explain [8]
3. (a) How many types of Hoisting applications are these? Explain any one. [8]
(b) What are the precautions that are required to be taken during the construction of blast furnace? [8]
4. (a) Describe the physical structure of a blast furnace. [8]
(b) Describe the reactions in Tuyere zone of blast furnace. [8]
5. (a) What are the basic functions of the slag in a modern blast furnace? [6]
(b) What are the various constituents of blast furnace slags? [3]
(c) What are the effects of CaO, SiO₂, AlO₃&MgO on fluidity of slags? [7]
6. (a) What are the common irregularities in blast furnace? [3]
(b) What are the remedies for the irregularities in blast furnace? [7]
(c) Describe the various types of 'Hanging' process in blast furnace. [6]
7. (a) What is the importance of 'Pre-reduced ore as burden in the blast furnace'? [8]
(b) Describe the process of 'Injection of reducing gas' at the bottom of stack? [8]
8. (a) What are the alternative routes of Iron production? Describe any one. [8]
(b) Explain the iron production in a low shaft furnace with the help of a neat sketch [8]

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1. (a) What is the necessity of agglomeration of Iron ores? Explain the various processes [9]
(b) What is the importance of sintering in steel plants? Explain [7]
2. (a) Explain with a neat sketch the dust catcher, for the purification of gases of blast furnace. [8]
(b) Describe the utilization of hot blast stove with a neat sketch. [8]
3. (a) How many types of Hoisting applications are these? Explain any one. [8]
(b) What are the precautions that are required to be taken during the construction of blast furnace? [8]
4. (a) Describe the physical structure of a blast furnace. [8]
(b) Describe the reactions in Tuyere zone of blast furnace. [8]
5. (a) What is the relationship of acid burdening & external desulphurisation of blast furnace? [6]
(b) Write short notes on [5]
 - i. External Siliconisation
 - ii. The sulphur problem [5]
6. (a) Draw a neat sketch of variable stock line armair (cylindrical design) and Explain. [8]
(b) Draw a neat sketch of variable stock line armair (conical design) and Explain. [8]
7. (a) Explain the importance of improved hot blast stove design. [8]
(b) How oxygen enrichment of blast increases production rate? [8]
8. (a) Explain the process of coal based DR process [5]
(b) Explain the production of wrought Iron. [6]
(c) What are the advantages and disadvantages of wrought Iron? [5]

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1. (a) Discuss on the world production of iron and steel. [8]
(b) Describe in brief about the various processes followed in Indian steel plants. [8]
2. (a) What are the modern development in blast furnace construction? [8]
(b) Comment how blast furnace gas is utilized in the steel plants. [8]
3. (a) How many types of Hoisting applications are these? Explain any one. [8]
(b) What are the precautions that are required to be taken during the construction of blast furnace? [8]
4. (a) Describe the reactions in Stack zone of blast furnace. [8]
(b) Explain the kinetics of Iron oxide reduction in blast furnace. [8]
5. (a) Explain the analysis of blast furnace slag with varying basicity? [9]
(b) Explain with reasons the typical slags formed in the ladle after treatment with sodium carbonate? [7]
6. (a) Explain the 'Blowing out' operation in blast furnace? [5]
(b) Describe the lighting operation of blast furnace. [5]
(c) What are the differences between 'fanning' and 'back draughting' in blast furnace? [6]
7. (a) What are the advantages of auxiliary fuels at the Tuyere level with fully oxidized burden in the blast furnace operation? [8]
(b) Explain the differences between the fuel oil effect and natural gas effect in blast furnace. [8]
8. (a) Describe the HyL process of sponge Iron production. [6]
(b) Explain the advantages and disadvantages of HyL process of sponge Iron production [5]
(c) Explain the future of DR technology of Iron making. [5]

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1. (a) Explain the principles of sintering process generally followed? [8]
(b) Describe with a neat sketch the sintering process. [8]
2. (a) What are the various refractories used in blast furnace from top to bottom? Give your reasons for their selection. [9]
(b) Draw modern blast furnace sketch and explain all parts. [7]
3. (a) How many types of Hoisting applications are these? Explain any one. [8]
(b) What are the precautions that are required to be taken during the construction of blast furnace? [8]
4. (a) Describe the physical structure of a blast furnace. [8]
(b) Describe the reactions in Tuyere zone of blast furnace. [8]
5. (a) Explain the analysis of blast furnace slag with varying basicity? [9]
(b) Explain with reasons the typical slags formed in the ladle after treatment with sodium carbonate? [7]
6. (a) What are the precautions to be taken for a newly lined blast furnace? [7]
(b) Describe the process of 'Banking' in blast furnace. [9]
7. (a) What are the latest developments in Blast construction and operation in the modern blast furnace? Describe them [8]
(b) What are the advantages of 'Higher blast temperature' in blast furnace? [4]
(c) What is the importance of oxygen enrichment of blast in the blast furnace? [4]
8. (a) Explain the process of submerged arc furnace plant for pig Iron production. [8]
(b) Name any steel plant which produces Pig Iron by indirect process in India and explain the method followed. [8]
