

**Total number of printed pages – 4**      **B. Tech**  
**CPMT 6309**

## **Sixth Semester Examination – 2008**

### **IRON MAKING AND FERRO ALLOYS**

**Full Marks – 70**

**Time : 3 Hours**

*Answer Question No. 1 which is compulsory  
and any **five** from the rest.*

*The figures in the right-hand margin  
indicate marks.*



1. (a) Give suitable reasons to the following questions : 2 x 8
- (i) Basicity of bosh slag is always more than heath slag.
- (ii) Shorter in height the cohesive zone, lower will be the silicon content.
- (iii) The thermal reserve zone in the blast furnace is of great importance.

- (iv) Why is the submerged arc furnace preferred for the production of ferro alloys ?
- (v) Why ash fusion temperature of coal should be more than the rotary kiln operating temperature for sponge iron production ?
- (vi) For humidification of blast steam is introduced in the cold blast before it is preheated in the stove.
- (vii) A rotating chute is provided inside the furnace top cone.
- (viii) Higher reactive coke is undesirable for blast furnace operation.

- (b) Write full form of : 4  
DIOS, ACCAR, CODIR, INRED.

2. (a) Name the various integrated steel plants of India and mention their source of raw materials. 4
- (b) Why natural coal is not used as a fuel in a modern iron blast furnace ? 4

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- (c) Comment on typical iron ore deposit in India. 2
3. (a) What is pelletization ? Discuss theory of bonding in pelletization with special reference to presence of water particle system. 2+3
- (b) Discuss the objective of sintering of iron ore fines. Explain the use of super fluxed sinter in modern blast furnace. 3+2
- 4 (a) What do you mean by direct reduction ? How does percentage reduction of an iron ore differs with the percentage of metallization ? 2+2
- (b) Describe the MIDREX process in short and mention the advantages of this process over SL/RN process. 4+2
5. (a) What are the characteristics of manganese ore used for the production of ferromanganese ? Name four ferromanganese plants in India. 3+2
- (b) Explain the Physico-chemical principles involved in the production of high carbon ferromanganese. 5

6. (a) Discuss the conditions of effective desulphurization and dephosphorization in B.F. 5
- (b) Discuss the influence of slag basicity on its viscosity at different MgO level. 5
7. Write short notes on any *three* of the following : 10
- (a) Oxygen enrichment in Blast furnace
- (b) Bell less charging system
- (c) HYL process of sponge iron reduction
- (d) Pulverised coal injection
- (e) Metal Slag reaction
- (f) COREX Process of iron making.
8. (a) What is "Boudouard reaction"? What are its other names ? 4
- (b) Draw a neat sketch of Fe-C-O diagram with respect to temperature and explain the role of CO/CO<sub>2</sub> ratio on the mechanism of reduction of iron ore (oxides) to produce iron. 6