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Total Number of Pages: 02

**B.Tech**  
**PEMT5409**

**8<sup>th</sup> Semester Regular / Back Examination 2016-17**

**ALTERNATIVE ROUTES OF IRON MAKING**

**BRANCH(S):METTA, MME**

**Time: 3 Hours**

**Max Marks: 70**

**Q.CODE: Z202**

**Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)**
- a) What are the objectives of alternative routes of iron making?
  - b) What is the role of Boudouard reaction in iron ore reduction?
  - c) Why coal having high volatile matter is not preferred for sponge iron production in rotary kiln?
  - d) How energy economic can be maintained in rotary -kiln process?
  - e) Name two fluidized bed process for sponge iron production.
  - f) How carburizing gas is generated In iron carbide process?
  - g) Why the metallization of sponge iron produced through HYL processes is not uniform?
  - h) What you mean by reduction smelting?
  - i) Classify the smelting reduction processes.
  - j) What is the concept of corex process?
- Q2 a) Discuss the important parameters for the selection of iron ore for sponge iron production. (5)**
- b) If sponge irons containing 60% metallic iron is blended with sponge iron containing 40% metallic iron what will be the value of FeM in the mixture? Define degree of reduction. (5)**
- Q3 a) Explain with a neat flow sheet the Krupp-CODIR process for DRI production. (5)**
- b) Mention the role of primary & secondary air blowing in Krupp-CODIR process. (5)**
- Q4 a) Discuss the operation & various reaction that take place in MIDREX shaft furnace. (5)**
- b) Mention prospects & salient features of MIDREX process. (5)**

- Q5** a) Explain the process description of COREX process with reference to (a) Reduction shaft (b) Melter gassifier (5)
- b) Discuss FINMET process for the production of DRI. (5)
- Q6** a) Discuss the sequence of operation of the reaction in HYL-I process. (5)
- b) Why reducing gas used in HYL-I process requires quenching? (5)
- Q7** Draw equilibrium phase diagram for Fe-C-O system. With the help this diagram explain the followings : (10)
- i. Below 570°C equilibrium between iron and magnetite.
  - ii. Carbon decomposition reaction
  - iii. Reduction of magnetite to wustite and wustite to iron
  - iv. Carbon monoxide as a useful reductant between 700°C to 1100°C.
- Q8** Write short answer on any TWO: (5 x 2)
- a) Importance of ash fusion temperature
  - b) Effect of DRI On EAF performance
  - c) Off gas utilization in SL/RN process
  - d) Difference between COREX process & B/F process for iron making