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Total Number of Pages : 02

B.Tech  
PMT7J003

7<sup>th</sup> Semester Regular / Back Examination 2019-20

ALTERNATIVE ROUTES OF IRON MAKING

BRANCH : METTA, MME

Max Marks : 100

Time : 3 Hours

Q.CODE : HRB139

Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.

The figures in the right hand margin indicate marks.

**Part- I**

**Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)**

- a) What do you mean by Reformed Natural Gas?
- b) What do you mean by reoxidation of sponge iron?
- c) Signify the importance of volatile matter content in DRI process and mention the optimum range of volatile matter content.
- d) Initial deformation temperature of coal should be greater than that of the operating temperature of the kiln, explain why?
- e) Define the term reducibility and write down the mathematical expression for reducibility calculation.
- f) What do mean by thermal decrepitation and explain the process of net decrepitation calculation?
- g) State the role of cluster breaker in Midrex shaft furnace?
- h) What are the adverse effects of composition of the gangue on the production of Pig Iron?
- i) Illustrate with line diagram input and output of blast furnace?
- j) Write down the mechanism of accretion formation inside Rotary kiln chamber?

**Part- II**

**Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)**

- a) List the factors affecting reduction rate of iron ore and explain any two in detail?
- b) How the high temperature and oxygen enrichment of blast improves the performance of blast furnace?
- c) Discuss in detail about AOD process of secondary steel making?
- d) What is sponge iron? Discuss its advantages over scrap in steel making
- e) Briefly discuss the uses of DRI in steel making process
- f) Mention the main sources of sulphur content in DR processes and briefly explain about the controlling parameters.
- g) How the DRI affects the EAF performance and product characteristics? Explain.
- h) Mention the different sequential kinetics steps involved in gas based iron oxide reduction.
- i) What is the basic concept of COREX process? Explain briefly the COREX process with a neat flow sheet.
- j) Briefly explain the present status of alternative routes iron making in India.
- k) Mention the main sources of sulphur content in DR processes and briefly explain about the controlling parameters?
- l) How the DRI affects the EAF performance and product characteristics? Explain?

**Part-III**

**Only Long Answer Type Questions (Answer Any Two out of Four)**

- Q3** Explain “Double Slag Practice” of steel making in Electric arc furnace and its advantages? **(16)**
- Q4** Discuss role of various Ferro-alloys in making different types of steel? **(16)**
- Q5** Explain the rotary kiln based DRI process with proper illustration? **(16)**
- Q6** Briefly explain the Thermodynamics and Kinetic aspects of DRI process? **(16)**