

Total number of printed pages – 4

B. Tech
PEMT 6405

Eighth Semester Examination – 2008

ALTERNATIVE ROUTES OF IRON MAKING

Full Marks – 70

Time : 3 Hours

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

The figures in the right-hand margin indicate marks.

All the acronyms carry their usual meaning. Make suitable assumptions wherever necessary. Draw neat diagrams with proper labels.

1. Answer the following questions : 2 × 10
- (a) Why in coal-based DRI production through rotary kiln ash fusion temperature should be more than the kiln operating temperature ?



- (b) What is direct reduction process ?
- (c) Why wustite reduction is not possible below 1000 °C ?
- (d) Discuss palletizing of iron ore fines in **Tecnored** process of DRI production.
- (e) Why **Circored** produced final product doesn't contain any carbon ?
- (f) What is ring formation in rotary kiln of DRI production ?
- (g) What do you mean by reactivity of coal ?
- (h) Mechanism of sulphur removal is both a physical and chemical phenomena, discuss.
- (i) What is tumbling index ?
- (j) In COREX process alkali content of the ore has no significant effect on the process.
2. (a) What are the raw materials required for coal based sponge iron production in SL/RN process ? Discuss the properties of coal required in the above process.

2+3

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- (b) What do you mean by reducibility of iron ore ? Explain its importance in sponge iron production. 2+3
3. (a) Discuss thermodynamic aspects of sponge iron making using coal as reductant. 5
- (b) Draw and discuss Fe-O-C diagram for the reduction of iron oxide. 5
4. (a) With a neat sketch discuss HYL-III process for the production of sponge iron. 6
- (b) Mention the advantages and limitations of HYL process over SL/RN process. 4
5. (a) Explain with a flow sheet the production of sponge iron by CODIR process. 6
- (b) Mention salient features and prospects of CODIR process. 4
6. (a) What is iron carbide ? Explain the process of producing iron carbide with a schematic diagram. 2+4

- (b) Discuss reduction reaction sequences with special reference to hematite ore. 4
7. (a) What do you mean by direct smelting process ? Discuss COREX process of smelt reduction with a flow sheet. 2+4
- (b) On what aspects COREX process differs from conventional blast furnace route. Discuss the wide range applications of Export gas obtained from COREX process. 2+3
8. Write short notes on any *three* : 10
- (a) Storage and handling of DRI
- (b) Use of DRI in EAF
- (c) HISMELT process
- (d) Degree of metallization and degree of reduction
- (e) Re-oxidation of sponge iron.

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