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# CS/B.Tech(CT)/SEM-5/CT-505/2009-10 2009

## **METALLURGY**

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

#### GROUP - A

## ( Multiple Choice Type Questions )

1. Choose the correct alternatives for any ten of the following:

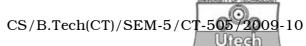
 $10 \propto 1 = 10$ 

- i) Chromium is added to steel
  - a) as carbide former
  - b) to increase corrosion resistance
  - c) to increase resistince to oxidation
  - d) to improve hardenability
  - e) for all the above reasons.
- ii) Metal above Carbon in reactivity series in normally extracted from its ore by
  - a) reaction with carbon
  - b) reduction with hydrogen
  - c) by electrolysis
  - d) they are native metal, do not need to be reduced.

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- iii) Mechanism of sintering in powder metallurgy process follows the
  - a) solid state diffusion route
  - b) surface diffusion route
  - c) evaporation codensation route
  - d) none of these.
- iv) Ladle Shroud used in continuous casting are commonly made of
  - a) Alumina graphite
  - b) Fused silica
  - c) Zirconia
  - d) High alumina castables.
- v) In basic process of steel making, deoxidation is rerely carried out in the presence of slag because
  - a) inclusion removal become easy
  - b) phosphorus would return to the metal
  - c) slag become too viscous
  - d) none of these.
- vi) In EAF route of steel making, *X* helps to create a foamy slag provides lower electricity consumption, faster melting time, decreased electrode consumption, longer refractory life and enhanced steel quality. *X* is
  - a) Ferro-scrap
- b) Sponge Iron
- c) High Temperature
- d) Ferro-silicon.
- vii) Phosphorus in steel
  - a) imparts cold shortness (Brittleness at low or normal temp. )
  - b) increases tensile strength
  - c) reduces impact strength & ductility
  - d) responsible for all the above properties.



- viii) Steel production in India currently is about
  - a) 20 MT

b) 30 MT

c) 90 MT

- d) 55 MT.
- ix) Al  $_2$  O  $_3$  obtained by Bayer process is taken into solution for electrolysis by dissolving in
  - a) Sodium fluoride
- b) Cryolite
- c) Fluorspar
- d) Aluminium fluoride.
- x) Chalcopyrite is an ore of
  - a) Aluminium
- b) Iron
- c) Copper
- d) Zinc

- e) Lead.
- xi) Anode sludge generated during electrolytic refining of Copper contains metal like
  - a) Silver & Gold
- b) Lead
- c) Mercury
- d) Tungsten
- e) Selenium.
- xii) Above 914°C Pure Iron is
  - a) BCC
  - b) FCC
  - c) Tetrahedral.
- xiii) Role of casting powder used in closed continuous casting is
  - a) as coolant
  - b) as deoxidant
  - c) as lubricant.

#### **GROUP - B**

### (Short Answer Type Questions)

Write short notes on any three of the following.

 $3 \infty 5 = 15$ 

- 2. Properties & Uses of Aluminium.
- 3. Continuous Casting of Steel.
- 4. Advantages & Disadvantages of Power Metallurgy Process.
- 5. Allotropic transformation in Iron.
- 6. Metal casting.
- 7. Isothermal transformation curve of steel.

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#### **GROUP - C**

## (Long Answer Type Questions)

Answer any *three* of the following.



- 8. Draw the Iron-Iron carbide phase diagram. Elaborately label the phases & indicate the respective temperature of formation of such phases. Discuss the reaction taking place in the system. 5+5+5
- 9. Draw a neat sketch of Blast Furnance. Describe the important reaction occurring during the process & metion about the process conditions like temperature, pressure etc. Describe the types of refractories used in differnt zones of Blast Furnance. 5+6+4
- 10. Describe Corex process with flow diagram. What are the advantages of Corex process? How it differs from Blast furnace process. What are the parameters, which influence Corex process? 7 + 4 + 2 + 2
- 11. Describe Pyro-metallurgical extraction process of copper. Mention about few important alloys of copper their properties & uses. 9+6
- 12. What is powder Metallurgy? What are the different methods of Powder Metallurgy? Describe them in short. Describe the design consideration of Powder Metallurgy. 2 + 2 + 5 + 6
- 13. What are the differences between Primary & Secondary route of Steel Making? Describe the Basic oxygen Steel Making process. What is Vacuum Degassing? What are the advantages of VD? 3+7+3+2
- 14. What are advantages of continuous casting over Ingot casting? Draw a process flow sheet of con-cast process. What is the role of Tundish in the Con-cast process? What is close & open casting? Describe the refractory items used in Con-cast. 2+5+2+2+4

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