Name : .....

Roll No. : .....

Invigilator's Signature : .....

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 : $10 \times 1 = 10$

   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.

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_2O_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. $3 \times 5 = 15$

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.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 ∞ 15 = 45

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