B.E. Fourth Semester (Mechanical Engineering) (CGS)

10836 : Engineering Metallurgy : 4 ME 02

P. Pages : 2 | AU - 2569

Time : Three Hours | Max. Marks : 80

Notes : 1. Answer **three** question from Section A and **three** question from Section B.
2. Illustrate your answer necessary with the help of near sketches.

SECTION-A

1. a) What are the different crystals structures present in metals? Find the atomic packing factor for any two. **8**

b) How are the metals classified? Describe the important properties & applications of ferrous metals? **5**

OR

2. a) Explain in brief the following term. **7**
i) Space lattice
ii) Unit cell
iii) Coordination number
iv) Atomic packing factor

b) What is solid solution and explain 'Hume Rothery's rules for formation of Substitutional solid solution. **6**

3. a) Draw a neatly labelled Fe-C equilibrium diagram and explain the cooling of 0.4% C steel from liquid state to room temperature. Also calculate % of Ferrite and Pearlite present at room temperature. **9**

b) What are composites? What are their advantages and applications? **5**

OR

4. a) Draw a neatly labelled Fe-C equilibrium diagram and calculate the weight percentage of phases present at room temperature for **8**
i) 0.14% C steel ii) 0.5% C steel
iii) 0.8% C steel iv) 1.3% C steel

b) Describe various isothermal reactions present on Fe-C diagram. **6**

5. a) Why are the alloying elements added to steel? Explain the effect of alloying elements on TTT diagram? **8**

b) What is 'Hadfield's Manganese steel? Draw and explain the heat treatment cycle for these steels. **5**

OR

6. a) What are 'High speed steels'? Explain with a neat sketch heat treatment for HSS. **7**

b) How are the alloying elements classified? Explain. **6**

SECTION-B

7. a) Distinguish between 8
   i) Malleable cast iron and Nodular cast iron.
   ii) White cast iron and gray cast iron.

   b) What are Brasses and Bronzes? Give the composition and applications of any two types of Brasses. 5

OR

8. a) Explain the following. 6
   i) Season Cracking
   ii) Gun metal
   iii) Muntz metal.

   b) Explain with neat sketch the steps involved in the production of malleable cast iron. 7

9. a) Explain the following: 9
   i) Autempering
   ii) Martempering
   iii) Patenting

   b) Explain the phenomenon of pearlite formation with neat sketches. 5

OR

10. a) Define 'Annealing'. Explain in detail the various types of Annealing processes. Also state the purpose of each type. 9

    b) Define 'tempering'. With suitable sketch the various stages of tempering. 5

11. a) Explain 7
    i) Recovery
    ii) Recrystallization and
    iii) Grain growth.

    b) What is slip? Explain why the actual stress required to cause slip is much less then the theoretical stress? 6

12. a) What is Powder metallurgy? Explain with suitable example the production of a component using this technique. 8

    b) Explain the following. 5
    i) Preferred Orientation
    ii) Strain Ageing

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