

**B.TECH SEM – V (2007 COURSE) (PRODUCTION ENGG.) :**  
**WINTER - 2017**

**SUBJECT : ENGINEERING METALLURGY**

Day : **Thursday**  
Date : **11/01/2018**

**W-2017-2479**

Time **02.30 PM TO 05.30 PM**  
Max. Marks : 80

**N.B.**

- 1) Q.1 and Q.5 are **COMPULSORY**. Out of the remaining attempt any **TWO** questions from each Section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Assume suitable data if necessary.

**SECTION – I**

- Q.1** Explain Why? any **SEVEN** from the following: **(14)**
- a) In preparation of specimen for metallography time of Etching and temperature are also very important consideration.
  - b) In macro-structure observation level of skill and experience is necessary for correct evaluation of the surface details.
  - c) The density increases by 8.9% when iron changes from B.C.C. to F.C.C. structure.
  - d) Polymer quenchants have distinct advantages over the usual water or oil quenchants.
  - e) Patenting heat treatment is used in wire drawing industry.
  - f) To often maximum case depth In case of pack carburizing higher temperature is not desirable but longer duration may be desirable.
  - g) Depth of hardened layer in flame hardening depends on distance between the gas flames and the component surface.
  - h) Wrought iron show fibrous fracture in fracture analysis or macroscopic analysis.
- Q.2** Answer the following: **(05)**
- a) Describe the three reactions occurs in Iron-carbide diagram find out amount of phase by using lever rule.
  - b) Explain sulfur print test as macroscopic examination method used for steels. How it is different than microscopic examination. **(04)**
  - c) Explain the steel specifications on the basis of AISI and IS . **(04)**
- Q.3**
- a) Describe the different method of minimize the retained Austenite in Hardening process. What are the problems if retained Austenite is not reduced? **(05)**
  - b) An AISI 1060 steel is heated to 840<sup>0</sup> C soaked at the temperature and cooled with three different cooling rate such as: **(04)**
    - i) Very slow cooling in furnace
    - ii) Isothermal cooling
    - iii) Water quenchingWhat type of microstructure will be produced in each piece? Also sketch the microstructure produced. Which piece will have highest hardness? Show cooling its on TTT diagram.
  - c) Explain the difference between hardenability and hardness. On what factors it depends? How hardenability is measure? **(04)**

P.T.O.

- Q.4 a) Explain the necessity of surface hardening. What are major limitations of carbonitriding? Give different case depth obtained in each surface hardening. (05)
- b) Why H.T. are carried out under controlled atmospheres? Explain the different types of atmospheres used in annealing and normalizing heat treatments. (04)
- c) Plain carbon steels cannot be nitrided effectively. Why? Which alloying elements are added to give effective nitriding? (04)

#### SECTION – II

- Q.5 Solve any **THREE** of the following: (14)
- a) Explain the role of alloying elements in steels.
- b) Limitations of plain carbon steels and advantages of alloy steels.
- c) Production of malleable cast irons and its uses.
- d) Short information about Al-Si and Al- Si - Cu alloys.
- e) Describe the effect of increasing zinc content on the properties of brasses.
- Q.6 a) Suggest suitable non-ferrous material with its chemical composition with reason for the following component any **FIVE**: (05)
- |                          |                        |
|--------------------------|------------------------|
| i) Hardware bolt         | ii) Dress Jewelry      |
| iii) Heat exchanger tube | iv) Non sparking tools |
| v) Coins                 | vi) Brazing rods       |
- b) What is phosphor bronzes? Where it is used? Give their properties (04)
- c) What are the requirements of bearing? How are these fulfilled in practice? Give compositions of bearing materials (04)
- Q.7 a) Draw the microstructure of following. Give the chemical composition and application of each. (05)
- |                                |                         |
|--------------------------------|-------------------------|
| i) Ferrite nodular cast iron   | ii) Pearlitic S.G. iron |
| iii) Ferro pearlitic gray C.I. |                         |
- b) Differentiate between steel and cast irons in details. (04)
- c) Types of gray cast iron on the basis of graphite flaks. (04)
- Q.8 a) .Describe the classification of tool steels. (05)
- b) ♣What is weld decay ? How it is minimized ? (04)
- c) What do you know about the Austenitic stainless steels .Where it is used? (04)

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