

B.Tech. SEM -IV Production 2014 Course (CBCS) : WINTER - 2018
SUBJECT : MATERIAL SCIENCE

Day : Thursday
Date : 15/11/2018

W-2018-2364

Time : 02.30 PM TO 05.30 PM
Max. Marks : 60

N. B. :

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagram **WHEREVER** necessary
- 4) Assume suitable data if necessary.

-
- Q. 1**
- a) What is slip? Why plastic deformation does occurs by slip? Give typical slip planes and directions for F.C.C. and B. C.C. metals. (05)
 - b) Find the number of atoms/cm² along the (101) and (010) planes for Au metals if the center of interatomic distance of close atoms is = 4.14⁰Å. (05)

OR

- a) What is cold working and hot working? In which respect the hot working is superior to cold working? (05)
- b) Calculate the X-Ray density of Fe atoms at room temperature if radius = 1.84 Å⁰. Atomic weight = 63.48 gm/mole. N is 6.02 × 10²³ atoms/ mole. (05)

- Q. 2**
- a) What is creep? In which applications it should be considered? How is the creep resistance improved? (05)
 - b) Draw self explanatory sketches for following: (05)
 - i) Indenters in Rockwell hardness test
 - ii) S.N. curves in steels
 - iii) True stress strain curves for M.S.
 - iv) Impression in Vickers hardness test.
 - v) Transient temperature curve

OR

- a) Find out the hardness no. from following data: (05)
 - i) Load P = 120 kg square impression d₁ = 0.321 and d₁ = 0.323mm
 - ii) Circular impression of diameter d = 2.31 mm under the ball indenter 5 mm size if load is 60 kg.
- b) Explain the principle of ultrasonic inspection methods? Write its applications. Give their advantages and limitations. (05)

- Q. 3**
- a) What are solid solutions? What are its different types? State the factors affecting solid solubility? (05)
 - b) Draw a partial eutectic system diagram and show cooling of one hypo eutectic alloy and one hyper eutectic alloy from high temperature to low temperature with suitable sketches. (05)

OR

P. T. O.

- a) Draw equilibrium diagram from following information. Melting point of element B is 750°C . Melting point of element A is 880°C . Both element at 60 % A and 40 % B mixed get melt at 600°C . Find the amount of free A % at 30 % B. by use of lever rule. (05)
- b) Explain the non-equilibrium cooling. What are the effects observed due to non-equilibrium cooling? (05)

- Q. 4 a) Explain the manufacturing of metal powder by electrolysis process. What are its characteristics? (05)
- b) Draw the flow chart of manufacturing of friction (break) materials by P/M process. (05)

OR

- a) What is hot compacting? What are its types? List the advantages of each process. (05)
- b) Describe the advantages and limitations of powder metallurgical processes. (05)

- Q. 5 a) Write short information about Advance ceramic materials its uses, properties, manufacturing methods. (05)
- b) What are the characteristics required for reinforced materials and for the matrix materials? List out some commonly used these materials. (05)

OR

- a) Explain the manufacturing method of polymer matrix composites with neat sketch. (05)
- b) List out the silicate structures of common ceramic materials. (05)

- Q. 6 a) Why is season cracking? Is it major problem in brass components? (05)
- b) What are the criteria for material selection in view of corrosion prevention? (05)

OR

- a) What are the different methods of vapour deposition? Explain any one in details. (05)
- b) Distinguish between the following hydrogen absorption and oxidation in corrosion. (05)

* * * * *