

**B.Tech. SEM -IV Production 2014 Course (CBCS) : WINTER -
2017**

SUBJECT: MATERIAL SCIENCE

Day: **Wednesday**
Date: **22/11/2017**

W-2017-2100

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

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Marks are **RESERVED** for necessary diagram.
- 3) Figures to the right indicate **FULL** marks.

- Q.1 a)** Explain why? Higher will be dislocation density higher will be hardness. (05)
- b)** Find out the number of atoms per mm² in Al (FCC) along the (001) and (101) plane if $r = 3.67^{\circ}\text{A}$. (05)

OR

- Q.1 a)** What are miller indices in crystal structures? Draw the planes and direction if miller indices are as follows: (110), (112), (100), [110],[111]. (05)
- b)** Find the theoretical density of Fe metal (BCC) if $r = 2.7^{\circ}\text{A}$ and atomic wt 46.7 gm/ mole where $N = 6.02 \times 10^{23}$ atoms/mole. (05)

- Q.2 a)** For eddy current test explain the principle and steps involved in testing with advantages and applications. (05)
- b)** Find out the hardness No from following data. (05)
- i) In mild steel block during hardness testing it gives circular impression of diameter 2.21 mm under 250 kg load when ball indenter of 5 mm is used.
 - ii) By using Poldi hardness tester of std. bar having hardness 181 BHN gives impression on it is 2.8 mm while on copper plate impression is obtained circular shape of diameter 3.1 mm.
 - iii) On standard polished test block square impression of diagonal lengths $d_1 = 0.575$ mm and $d_2 = 0.565$ mm under 120 kg load.

OR

- Q.2 a)** What is creep? How creep life of component is improved? (05)
- b)** Compare the ultrasonic test with X ray radiography. (05)
- Q.3 a)** Define the following: (05)
- i) Interstitial Solid solutions
 - ii) Eutectic alloy
 - iii)Gibb's phase rule
 - iv) Hypo eutectic alloy
 - v) Dendritic structure
- b)** Describe the level rule with suitable example. Draw the partial solubility eutectic diagram and with lever rule calculate the amount of pro eutectic " α " phase at 10% B. (Assume suitable data for explanation). (05)

OR

- Q.3 a)** Explain the phenomena of micro segregation how the coring is eliminated? (05)
- b)** Draw the equilibrium diagram for eutectic alloy and show cooling of hyper eutectic alloy from high temperature to low temperature. (05)

P.T.O

- Q.4 a)** Explain the production of metal powder by electrolysis process. Give its characteristics. (05)
- b)** Describe in detail different types of compacting methods with heat and give their advantages and limitations in powder metallurgy. (05)

OR

- Q.4 a)** Describe the following terms : (05)
- i) Apparent density ii) Flow rate of powder
iii) liquid phase sintering iv) Green strength
v) Spring back effect of compact
- b)** What is meant by hot isostatic (HIP)? Explain with neat sketch its advantages and applications. (05)

- Q.5 a)** List out the different type of ceramic materials give there some electrical, mechanical, thermal and chemical properties. (05)
- b)** Describe the manufacturing of glass fiber in composite. Write its properties. (05)

OR

- Q.5 a)** Determine the young's modulus of a composite containing 48% volume of glass fiber $E_f = 58 \text{ GN/m}^2$ in A matrix of epoxy resin ($E_m = 21 \text{ GN/m}^2$ under the isostress condition). (05)
- b)** Give the classification of ceramic materials with suitable example of each type. (05)

- Q.6 a)** What is wet corrosion? What are its types? Describe any two in details. (05)
- b)** Explain the CVD process with its advantages and industrial applications. (05)

OR

- Q.6 a)** What is pit type corrosion? How it is occurs? Can it minimize? How? (05)
- b)** Describe how the components design plays most important role in corrosion prevention methods. (05)

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