

**B.TECH. SEM -IV PRODUCTION 2014 COURSE (CBCS) :**

**SUMMER - 2018**

**SUBJECT: MATERIAL SCIENCE**

Day: **Thursday**  
Date: **07/06/2018**

**S-2018-2308**

Time: **10.00 AM TO 01.00 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 the phenomena of Recrystallization and Annealing. **(05)**

**b)** Find out the number of atoms per  $\text{mm}^2$  in Fe (BCC) along the (101) and (100) plane if  $r = 2.71 \text{ \AA}$ . **(05)**

**OR**

**Q.1 a)** How plastic deformation in a polycrystalline materials is different than in single crystal? Explain the effect of heat on it. **(05)**

**b)** Find the theoretical density of Cu metal if  $r = 3.2 \text{ \AA}$  and atomic wt 54.96 gm/mole where  $N = 6.02 \times 10^{23}$  atoms/mole. **(05)**

**Q.2 a)** For magnetic flux test explain in the principle and steps involved in testing. **(05)**

**b)** Find out the hardness no from following data. **(05)**  
i) If 120 kg load is applied on M.S plate with square base indenter gives  $d_1 = 0.067$ ,  $d_2 = 0.072 \text{ mm}$  are the diagonals length.  
ii) Ball indenter of 2.5 mm diameter is used for testing of aluminum plate it gives circular impression of diameter 1.35 mm under the load 65 kg.

**OR**

**Q.2 a)** What is creep? How creep test is conducted? **(05)**

**b)** Compare the ultrasonic test with X ray radiography. **(05)**

**Q.3 a)** Define the following: **(05)**

- i) Pro eutectic phase
- ii) Eutectic alloy
- iii) Gibb's phase rule
- iv) Hyper eutectic alloy
- v) Solid solutions

**b)** Draw the equilibrium the diagrams only. **(05)**

- i) Two elements the soluble in liquid state and not soluble in solid state.
- ii) Two elements live not solubility in liquid as well as in solid state. Give the one one example of such systems.

**OR**

**Q.3 a)** Explain the phenomena of micro segregation. How the coring is eliminated? **(05)**

**b)** Draw the equilibrium diagram for partial solubility eutectic system. If elements **A** is soluble in element **B** at room temperature 8% and it increases with temperature up to 12 % at eutectic point  $380^\circ\text{C}$ . While solubility of element **B** in element **A** is 10 % at a room temperature and it increases up to 15 % at eutectic temperature. Eutectic point is 40 % B. M.P of **A** =  $440^\circ\text{C}$  and M.P. of **B** is  $500^\circ\text{C}$ . Find the amount of  $\alpha$  phase at 25% B by using lever rule. **(05)**

**P.T.O**

**Q.4 a)** Explain the production of metal powder by carbonyl 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)** What are the advantages of powder metallurgy over other manufacturing technique? (05)

**b)** Explain with all parameters production of carbide tool by powder metallurgy. (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 dispersion strengthen composite with suitable example. (05)

**OR**

**Q.5 a)** Determine the Young's modules 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)** Write a short note on refractory materials as ceramics. (05)

**Q.6 a)** Describe how the components design plays most important role in corrosion preventions methods. (05)

**b)** Explain the phenomena of inter granular corrosion. (05)

**OR**

**Q.6 a)** Explain the CVD process with its advantages and industrial applications. (05)

**b)** What is pit type corrosion? How it is occurs? Can it minimize? How? (05)

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