CBCS SCHEME

USN `| | | | | | | | | |`   **15AU32**

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Material Science and Metallurgy

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define Space lattice. Find out basic atoms and packing factors or packing densities for B.C.C and F.C.C. Draw concerned diagram. **(08 Marks)**
   b. Differentiate between edge and screw dislocations with sketches. **(08 Marks)**

OR

2 a. With the help of a neat conventional stress – strain diagram, explain the behaviour of mild steel , under static uniaxial , tension till fracture. **(06 Marks)**
   b. Draw the stress – strain curve for the following materials : i) Copper   ii) Cast iron. **(02 Marks)**
   c. Explain Slip and twinning with figures. **(06 Marks)**
   d. Define : i) Resilience   ii) Ductility. **(02 Marks)**

Module-2

3 a. With the help of neat sketches, explain the different stages of ductile cup and cone fracture. **(08 Marks)**
   b. Define Creep. With a typical creep curve, explain the different stages of creep. **(08 Marks)**

OR

4 a. What is Fatigue? Draw and explain the SN curves for : **(08 Marks)**
      i) A material that displays a fatigue limit.
      ii) A material that does not display a fatigue limit.
   b. What are the various factors affecting fatigue strength? Explain. **(08 Marks)**

Module-3

5 a. Define Solid solutions and explain different types of solid solutions with figures. **(08 Marks)**
   b. Explain the homogeneous nucleation. Discuss the significance of critical radius of the nuclei. **(08 Marks)**

OR

6 a. Explain with examples : i) Gibbs phase rule   ii) Lever rule. **(12 Marks)**
   b. What are invariant reactions? With a neat sketches, explain
      i) Eutectic reaction   ii) Eutectoid reaction. **(04 Marks)**

Module-4

7 a. Explain the construction of TTT diagram, with figure and label it. **(08 Marks)**
   b. Write a short note on the following heat treatment processes :
      i) Annealing   ii) Carburizing. **(08 Marks)**

OR

8 a. Give the composition and uses of various cast – irons. (08 Marks)

    b. Write a note on Aluminum alloys. (08 Marks)

Module-5

9 a. Define Composite materials. Explain the role of matrix material in a composite. (04 Marks)

    b. What are the advantages and limitations of composite materials? (06 Marks)

    c. With a neat sketch, explain any one method for production of fibre reinforced plastic.

    (06 Marks)

OR

10 a. What are shape memory alloys? With a neat sketch, explain the stress – strain characteristics of SMA's as a function of temperature. (08 Marks)

    b. What are the biological applications of smart materials used as implants? (04 Marks)

    c. Write a note on use of non – destructive testing. (04 Marks)

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