CBCS Scheme

USN | | | | | | | | | | |

15AU32

Third Semester B.E. Degree Examination, June/July 2018

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 the following lattice:
   i) Unit cell
   ii) Space lattice
   iii) Atomic packing factor
   iv) Coordination number **(04 Marks)**

b. State and explain Fick's first law of diffusion. **(04 Marks)**

c. What do you mean by crystalline imperfection? Explain briefly point and scalar/line defects. **(08 Marks)**

OR

2 a. Explain in detail the mechanical properties in elastic and plastic region. **(08 Marks)**

b. Discuss how the slip phenomenon differs in case of a polycrystal to the single crystal. **(08 Marks)**

Module-2

3 a. Define creep and discuss any two mechanisms for creep. **(08 Marks)**

b. Discuss the basic modes of fracture with a neat sketch. List the difference between them. **(08 Marks)**

OR

4 a. What is fatigue? Draw the S-N curves for steel and aluminum. **(08 Marks)**

b. Discuss the factors affecting the fatigue life of a component. **(08 Marks)**

Module-3

5 a. Explain the homogeneous nucleation. Discuss the significance of critical radius of nuclei. **(08 Marks)**

b. Define solid solution, and explain the different types of solid solution. **(08 Marks)**

OR

6 a. State the Gibb's phase rule and explain with a simple example. **(08 Marks)**

b. Draw the eutectic and eutectoid phase diagram. Give the invariant reactions. **(08 Marks)**

Module-4

7 a. Draw the iron-carbon equilibrium diagram and label all the fields. Write the different invariant reactions. **(08 Marks)**

b. Explain the steps to construct TTT diagram. Draw a sketch of a TTT diagram, label all the fields for an eutectoid steel. **(08 Marks)**

OR

8 a. Differentiate between SG iron, grey iron and white iron with respect to microstructure, composition, properties and applications. **(08 Marks)**

b. What are brasses and bronzes? Give an account of composition and application of α - brasses? **(08 Marks)**

Module-5

9 a. Explain the following for production of FRP:
i) Spray layup process
ii) Pultrusion process **(08 Marks)**

b. Explain with a neat sketch production of MMC by using powder metallurgy process. **(08 Marks)**

OR

10 a. Define composite material and give the classification of composites. Enumerate important characteristics of composites. **(08 Marks)**

b. Describe the features of Fibrous composites, laminated composites and particulate composites. **(08 Marks)**

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