CBCS Scheme

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

15AU32

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Material Science and Metallurgy

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Write sketches wherever required.

Module-1

1 a. Explain the FCC structure. Find the APF from the basics. **(06 Marks)**
b. Differentiate between Edge and Screw dislocation. **(05 Marks)**
c. With neat sketches, explain the mechanism of diffusion. **(05 Marks)**

OR

2 a. Sketch the stress – strain diagram for a ductile material indicating the salient points and explain i) Elasticity ii) Ductility. **(06 Marks)**
b. Differentiate between slip and twinning. **(05 Marks)**
c. Explain with sketches : i) Offset yield strength ii) Secent modulus. **(05 Marks)**

Module-2

3 a. Differentiate between Ductile and brittle fracture. **(05 Marks)**
b. With neat sketches, explain the stages in the formation of cup and cone fracture. **(06 Marks)**
c. With ϵ - t curve, explain the different stages of creep. **(05 Marks)**

OR

4 a. What is Stress relaxation? Derive an expression of stress relaxation. **(06 Marks)**
b. Explain the mechanism of fatigue. **(05 Marks)**
c. What is Endurance Limit? Explain how SN diagram is plotted for a material. **(05 Marks)**

Module-3

5 a. Explain Crystal growth and nucleation, with neat sketches. **(05 Marks)**
b. Explain the various types of cast metal structures. **(06 Marks)**
c. Explain the rules governing of formation of substitutional solid solution. **(05 Marks)**

OR

6 a. Explain Eutectic and Eutectoid reactions, with an example. **(06 Marks)**
b. Sketch and explain the cooling curves of Solid solution, Pure Eutectic and Partially Eutectic and Partially solid solution. **(06 Marks)**
c. Explain Gibb's phase and Lever rule. **(04 Marks)**

Module-4

7 a. Explain how TTT diagrams are constructed. **(06 Marks)**
b. Differentiate between Annealing and Normalising. **(05 Marks)**
c. Explain the Flame hardening process, with neat sketch. **(05 Marks)**

OR

8 a. Explain the Composition, Properties and Microstructure of the following :
i) Grey cast Iron ii) S G Iron. **(06 Marks)**

b. Write a note on : i) Phosphor Bronze ii) α Brasses. **(06 Marks)**

c. Enumerate the different uses of Aluminum and its alloys. **(04 Marks)**

Module-5

9 a. What are Composites? Enumerate the complete classification of composites. **(06 Marks)**

b. Explain the Filament winding process, with neat sketch. **(06 Marks)**

c. Enumerate the advantages and applications of composites. **(04 Marks)**

OR

10 a. Write a note on Smart materials. **(05 Marks)**

b. Write a note on Shape Memory alloys. **(06 Marks)**

c. Write the different non destructive testing methods and enumerate its applications. **(05 Marks)**

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