CBCS SC

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17ME32

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Material Science

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain crystal imperfections with necessary diagrams. (12 Marks)
b. Draw the neat sketches of HCP and FCC structures. Also find out APF of the above structures. (08 Marks)

OR

2 a. Explain R.R. MOORE Fatigue testing technique with neat diagram and plot S-N curves for MS. Aluminium and Copper. (10 Marks)
b. Explain three stages of creep with the help of creep curve and also explain creep properties. (10 Marks)

Module-2

3 a. Explain types of solid solutions and factors governing the formation of best substitutional solid solutions (Hume-Rothery Rules). (10 Marks)
b. Explain Gibb's phase rule and lever rule with the help of suitable examples. (10 Marks)

OR

4 a. What is meant by homogeneous and heterogeneous nucleations? Derive the equation for critical radius in homogeneous nucleation. (10 Marks)
h. Draw the Iron-carbon diagram, mark all the pahses on it, write invariant reactions and invariant points. (10 Marks)

Module-3

5 a. Draw the T-T-T diagram with the help of transformation curves. Explain the structure of Martensite, Bainite and Retained Austenite. (12 Marks)
b. Explain Annealing and normalizing with the help of necessary graphs and diagra ms. (08 Marks)

OR

6 a. Explain in detail the surface hardening like, carburizing, cyaniding, nitriding flame hardening and induction hardening. (16 Marks)
b. Explain the concept of Austempering and Martempering. (04 Marks)

Module-4

7 a. Write note on structure, properties and applications of ceramics. (12 Marks)
b. Write note on mechanical and electrical behavior of ceramics. (08 Marks)

OR

8 a. Explain two plastic processing methods with neat diagrams. (12 Marks)
b. Write note on smart materials and shape memory alloys. (08 Marks)

Module 5

9 a. Write note on matrix materials and reinforcement materials. (10 Marks)
b. Write advantages, limitations and applications of composites. (10 Marks)

OR

10 a. Write note on any two polymer matrix composites production methods with neat diagrams. (12 Marks)
b. Derive the equation to calculate Young's modulus in iso-strain condition. (08 Marks)