CBCS SCHEME

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)**
   b. 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 diagrams. **(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)**

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