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CBCS SCHEME

USN | | | | | | | | | | 18MT32

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

Time: 3 hrs. Max. Marks: 100

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

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Sketch the stress – strain diagram for mild steel material and explain the salient points. **(05 Marks)**

b. State Fick's laws of diffusion. Explain the factors affecting diffusion. **(10 Marks)**

c. Differentiate between Slip and Twinning. **(05 Marks)**

OR

2 a. With the help of a creep curve, explain the stages of it. List out the factors affecting creep. **(10 Marks)**

b. Define Endurance limit. With S-N diagram explain fatigue behavior of a metal. **(05 Marks)**

c. With neat sketches, explain cup and cone fracture. **(05 Marks)**

Module-2

3 a. Draw TTT diagram for eutectoid steel and explain briefly. **(07 Marks)**

b. With net sketches, explain Austempering and Martempering. **(08 Marks)**

c. Differentiate between Annealing and Normalizing. **(05 Marks)**

OR

4 a. Enumerate the composition, properties and applications of Grey Cast Iron and spheroidal graphite iron. **(08 Marks)**

b. Explain briefly (i) α – brasses (ii) Phosphor bronze. **(08 Marks)**

c. Explain Age hardening of Aℓ-Cu on alloys. **(04 Marks)**

Module-3

5 a. Define Homogenous and Heterogeneous nucleation and mechanism of solidification with sketches. **(08 Marks)**

b. Derive an expression for critical radius of uncleus in homogenous nucleation. **(08 Marks)**

c. With neat sketches, explain substitution and interstitial solid solution. **(04 Marks)**

OR

6 a. Explain Hume Rothery's rule. **(06 Marks)**

b. Explain Gibb's phase and lever rule. **(06 Marks)**

c. Explain Eutectoid reaction and peritectic reaction. **(08 Marks)**

Module-4

7 a. Define composites. Give its classification based on reinforcement and matrix. **(06 Marks)**

b. With a neat sketch explain Pultrusion process. **(08 Marks)**

c. Explain the filament winding process with a neat sketch. **(06 Marks)**

OR

8 a. What are the roles of reinforcement and matrix? **(06 Marks)**

b. Differentiate between Thermoset and Thermoplastics. **(06 Marks)**

With a neat sketch, explain Injection moulding process. **(08 Marks)**

Module-5

9 a. What are shape memory materials? Explain properties and applications of it. **(06 Marks)**

b. Write a note on Magnetorheological fluids. **(06 Marks)**

c. Write a note on Piezoelectric material and Magnetostrictive materials. **(08 Marks)**

OR

10 Write a short note on :

i. Accelerometer
ii. Force sensors
iii. Load sensors
iv. Microphones
v. Impact Hammers. **(20 Marks)**

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