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## Third Semester B.E. Degree Examination, July/August 2022 Material Science and Metallurgy

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. With sketch explain B.C.C and F.C.C crystalline structures. (10 Marks)  
b. With sketches explain the various point defects. (10 Marks)

OR

- 2 a. Compare edge and screw dislocations. (14 Marks)  
b. State and explain I and II Fick's Law of diffusion. (06 Marks)

### Module-2

- 3 a. With sketches, explain the various stages involved in a ductile fracture. (15 Marks)  
b. Mention the factors affecting fatigue. (05 Marks)

OR

- 4 a. With typical creep curve, explain the various stages of creep. (10 Marks)  
b. Explain the factors that affect fatigue life of a material. (10 Marks)

### Module-3

- 5 a. Explain the two stages of solidification of a metal or alloy. (10 Marks)  
b. Make a comparison between homogeneous and heterogeneous Nucleation's. (10 Marks)

OR

- 6 a. State and explain in HUME ROTHERY'S ROLES that govern the formation of substitutional solid solution. (10 Marks)  
b. Explain with sketches Eutectic and peritectic reactions pertaining to phase transformation. (10 Marks)

### Module-4

- 7 a. State the objective of heat treatment. (08 Marks)  
b. Make a comparison between Normalising and Annealing. (12 Marks)

OR

- 8 a. With sketch, explain the working principle of induction hardening. (10 Marks)  
b. Define age hardening. Explain the three steps involved in age hardening. (10 Marks)

### Module-5

- 9 a. Define critical cooling rate, explain the factor that affects critical cooling rate. (10 Marks)  
b. With diagram, describe the hand layup process of fabricating a composite. (10 Marks)

OR

- 10 a. Mention the roles of matrix and Reinforcements in composite materials. (10 Marks)  
b. Define Brass. State its important properties. (10 Marks)

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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.