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21MT33

## Third Semester B.E. Degree Examination, June/July 2023 Material Science and Manufacturing Technology

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define Atomic Packing Factor (APF). Calculate the APF for an Body centered cubic and Hexagonal closed packed crystal structure. (10 Marks)
- b. With a neat sketch differentiate screw and edge dislocation. (10 Marks)

OR

- 2 a. Draw detailed conventional and true stress-strain diagram for mild steel. Explain modulus of Resilience along with equation. (10 Marks)
- b. Following are the Tensile Test results of a steel specimen having 30 mm diameter and 200 mm length :  
Extension at a load of 50 kN = 0.1 mm ; Load at elastic limit = 230 kN,  
Maximum load = 300 kN ; Total extension = 50 mm,  
Diameter of rod at failure = 20 mm  
Calculate : (i) Young's modulus  
(ii) Percentage elongation  
(iii) Percentage decrease in area of steel rod. (10 Marks)

### Module-2

- 3 a. Define composite material and explain its classification based on matrix and reinforcement materials. (10 Marks)
- b. With a neat sketch, explain sheet moulding compound process and mention its advantages and limitations. (10 Marks)

OR

- 4 a. Sketch and explain the sequence of shape memory effect. (10 Marks)
- b. Explain Piezo Electric Material and mention its industrial applications. (10 Marks)

### Module-3

- 5 a. Explain in detail the basic steps involved in Sand casting. (10 Marks)
- b. With neat diagram, explain the construction and working principle of Coreless Induction Furnace. (10 Marks)

OR

- 6 a. Illustrate and explain True Centrifugal casting process and mention its advantages. (12 Marks)
- b. Define manufacturing process and briefly explain its classification. (08 Marks)

### Module-4

- 7 a. Define welding and give complete classification of welding process. (10 Marks)
- b. With a neat sketch, explain operation of Flux Shielded Metal Arc Welding. (10 Marks)

OR

- 8 a. With a neat sketch, explain the theory and operation of Laser Welding. (10 Marks)  
b. State the working principle of explosive welding. Mention its advantages, disadvantages and applications. (10 Marks)

Module-5

- 9 a. With a neat sketch, explain the features of orthogonal and oblique cutting. (10 Marks)  
b. Explain various types of operations that can be carried out on Lathe. (10 Marks)

OR

- 10 a. Write short note on :  
(i) Angular milling (10 Marks)  
(ii) Gang milling (10 Marks)  
b. Differentiate between drilling, boring and reaming operations. (10 Marks)

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