



CBCS SCHEME

21MT33

Third Semester B.E. Degree Examination, June/July 2024 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. Discuss briefly point imperfection in crystals and calculate APF for face centered cubic structure. (10 Marks)
- b. Neatly sketch stress strain diagram for mild steel depicting its mechanical properties under various types of loads. Calculate the stress, strain and elongation of a structural steel rod that has a radius of 10mm and a length of 1m. A 100kN force stretches it along its length. Young's of structural steel is $200 \times 10^6 \text{N/mm}^2$. (10 Marks)

OR

- 2 a. Explain Fick's law of diffusion and factors affecting diffusion. (10 Marks)
- b. With a neat sketch show $\sigma_T = \sigma(1 + \epsilon)$. Determine :
 - i) Engineering stress and strain
 - ii) True stress and strain for a low carbon steel rod which is subjected to tensile load of 7000kg ($68.67 \times 10^3 \text{N}$). Assume no change in volume during extension with an initial diameter of 13mm and under load 12mm. (10 Marks)

Module-2

- 3 a. With a neat sketch explain sheet moulding compound process used in processing polymer matrix composites. (10 Marks)
- b. Explain Piezoelectric material and mention its industrial applications. (10 Marks)

OR

- 4 a. Explain in brief metal matrix and polymer matrix composites and mention their various methods of processing. (10 Marks)
- b. Explain shape memory alloys and the sequence of its effect with illustration. (10 Marks)

Module-3

- 5 a. Explain the importance of the manufacturing process and give the complete classification of manufacturing processes. (10 Marks)
- b. With a neat sketch explain the working of cupola furnace. (10 Marks)

OR

- 6 a. Explain the concept of manufacturing and casting process along with their importance. (10 Marks)
- b. With a neat sketch explain the steps involved in squeeze casting process. Mention its advantages and disadvantages. (10 Marks)

Module-4

- 7 a. Define welding and give the complete classification. (10 Marks)
- b. With a neat sketch explain the spot welding process. (10 Marks)

OR

- 8 a. With a neat sketch explain the flux shielded metal Arc welding process. (10 Marks)
b. With a neat sketch explain the working principle and operation of Atomic hydrogen welding. (10 Marks)

Module-5

- 9 a. Differentiate between orthogonal and oblique cutting. (10 Marks)
b. Explain in brief simple, compound and differential indexing methods. Calculate required crank movement for dividing the work piece into 10 divisions in simple indexing method. (10 Marks)

OR

- 10 a. With a neat sketch explain Tool signature with $0 - 7 - 6 - 8 - 15 - 16 - 0.8$. (10 Marks)
b. Explain the methods of Taper turning on lathe. Determine the angle of taper for a length of 150mm and diameter of 80mm. The smaller diameter being 50mm. (10 Marks)
