



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

B.Tech IV Semester End Examinations (Regular), November – 2020

Regulation: IARE–R18

MATERIALS AND MECHANICS OF SOLIDS

(ME)

Time: 2 Hours

Max Marks: 70

Answer any Four Questions from Part A

Answer any Five Questions from Part B

PART – A

1. Describe the term strain hardening and work hardening of the materials. [5M]
2. Discuss the classification, properties and application of steel. [5M]
3. Explain clearly the following terms: i) Stress ii) Hook's law [5M]
4. What are the assumptions made in theory of simple bending? [5M]
5. What are the assumptions made in slope deflection method? How do you calculate deflection? [5M]
6. Write short notes on: i) Unit Cell ii) Crystal symmetry [5M]
7. What are the most common types of phase diagrams explain in brief? [5M]
8. What is the differential relation between bending moment, shear force and the applied load? [5M]

PART – B

9. Explain with neat sketches any two of the following crystal structures. i) Body-centered cubic (BCC) ii) Face-centered cubic (FCC) iii) Hexagonal close packed (HCP) [10M]
10. What is hot working and cold working process? Write the advantages of hot working over cold working process? How does cold work strengthen? [10M]
11. State Gibbs phase rule. What does a phase diagram indicate? [10M]
12. Explain the iron carbide equilibrium diagram with neat sketches. [10M]
13. A wooden tie is 60 mm wide, 120 mm deep and 1.50 m long. It is subjected to an axial pull of 30 kN. The stretch of the member is found to be 0.625 mm. Find the Young's Modulus for the tie material. [10M]
14. Construct the Mohr's circle for two like tensile stresses with neat sketches. [10M]
15. Draw the S.F. and B.M. diagrams for a simply supported beam of length L carrying a point load W at its middle point. [10M]
16. A steel plate is bent into a circular arc of radius 10 m. If the plate section be 12 cm wide and 2 cm thick, find the maximum stress induced and the bending moment which can produce the stress. Take $E=2 \times 10^6 \text{ kg/cm}^2$. [10M]
17. Determine the equation of deflection curve for a cantilever beam subjected to a uniform load of intensity q, also determine slope and deflection at the free end. Flexural rigidity of the beam is EI [10M]
18. A uniform girder of length 8 m is subjected to a total load of 20kN uniformly distributed over the entire length. The girder is freely supported at its ends. Calculate the deflection at the centre. [10M]
Take $E=2 \times 10^5 \text{ N/mm}^2$ and $I = 26 \times 10^6 \text{ mm}^4$