

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE, NOVEMBER - 2025**

**APPLIED MECHANICS & STRENGTH OF MATERIALS**

[Maximum marks: 100]

[Time: 3 Hours]

**PART – A**

**Maximum marks: 10**

**I.** (Answer *all* the questions in one or two sentences. Each question carries **2** marks)

1. Define Young's modulus.
2. What is the coefficient of friction?
3. Define the center of gravity.
4. List any two riveted joints.
5. Define stiffness.

(5 x 2 = 10)

**PART – B**

**Maximum marks: 30**

**II.** (Answer any *five* of the following questions. Each question carries **6** marks)

1. Draw a stress-strain diagram for mild steel under tension and mark the significant points.
2. Explain the shear stress and shear strain.
3. State the laws of solid friction.
4. Explain Lap and butt riveted joints.
5. State the failure of a thin cylindrical shell due to internal pressure.
6. Distinguish between closely coiled and open coiled helical spring.
7. List the assumptions in Euler's theory for columns.

(5 x 6 = 30)

**PART – C**

**Maximum marks: 60**

(Answer *one full* question from each unit. Each full question carries **15** marks)

**UNIT – I**

**III.** (a) Define volumetric strain and bulk modulus. (6)

- (b) Determine the change in length, breadth and thickness of a steel bar which is 6 m long, 40 mm wide and 30 mm thick subjected to a pull of 30KN in the direction of its length. Take  $E = 2 \times 10^5 \text{ N/mm}^2$  and Poisson's ratio = 0.2. (9)

**OR**

- IV.** (a) Define thermal stress and strain. (6)
- (b) A square bar 25mm sides and 200mm long is subjected to a pull of 100 KN in the direction of its length. The extension of the bar was found to be 0.120mm, while the decrease in each lateral dimension was found to be 0.0043mm. The value of the modulus of rigidity for the material of the bar is  $0.7 \times 10^5 \text{ N/mm}^2$ . Find the Young's modulus, Poisson's ratio and bulk modulus. (9)

**UNIT - II**

- V.** (a) Explain the perpendicular axis theorem. (6)
- (b) A block having 1000 N is pushed by a force of 200 N on a rough horizontal plane. If the line of action of push is  $20^\circ$  with horizontal. Find the coefficient of friction. (9)

**OR**

- VI.** (a) Define sliding friction and rolling friction. (6)
- (b) Find the centroid of the shaded section shown in fig 1. (9)

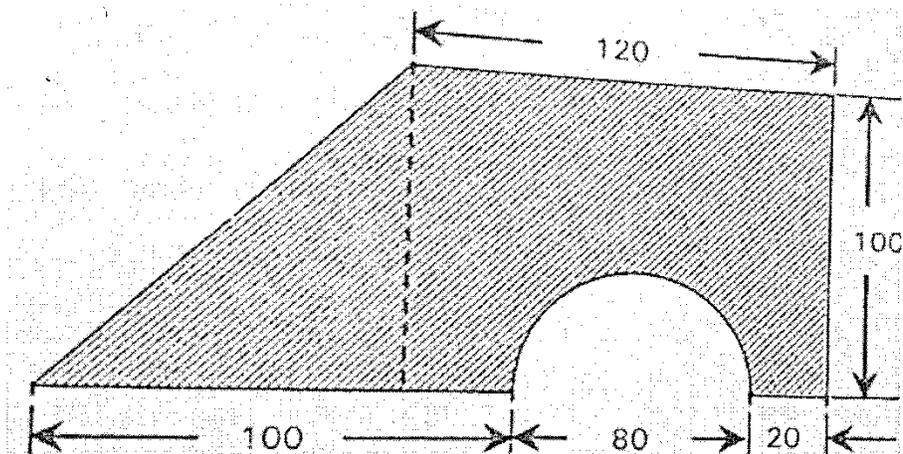


Fig.1

### UNIT - III

- VII.** (a) Explain hoop stress and longitudinal stress. (6)
- (b) Two plates of thickness 15 mm thick is connected using a single riveted double cover butt joint. The rivets are 30 mm diameter with 100 mm pitch. The allowable tensile stress is  $200\text{N/mm}^2$ , shear stress  $130\text{N/mm}^2$  and crushing stress is  $190\text{N/mm}^2$ . Determine the efficiency of joint. (9)

**OR**

- VIII.** (a) List different types of welded joints. (6)
- (b) A solid shaft of 200mm diameter transmit 180 kW power at 150 rpm. Find the maximum shear stress induced in the shaft. (9)

### UNIT - IV

- IX.** (a) Define columns and struts. (6)
- (b) Draw shear force and bending moment diagrams for the cantilever beam with loading shown in fig 2. (9)

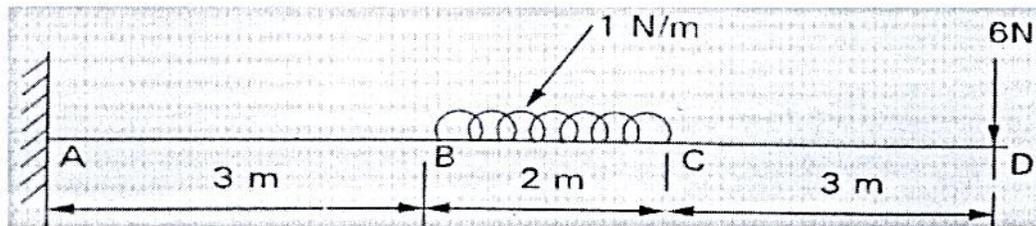


Fig. 2

**OR**

- X.** (a) Explain different types of loading. (6)
- (b) A beam 200 x 350 mm cross section supports a central load on a span of 5 m and the modulus of elasticity of the material is  $0.2 \times 10^5\text{N/mm}^2$ . Find out the maximum deflection, if the maximum bending stress is  $10^5\text{N/mm}^2$ . (9)

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