



C20-A-402

**7402**

**BOARD DIPLOMA EXAMINATION, (C-20)**

**OCTOBER/NOVEMBER—2023**

**DAE – FOURTH SEMESTER EXAMINATION**

**STRENGTH OF MATERIALS AND FLUID MECHANICS**

Time : 3 Hours ]

[ Total Marks : 80

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**PART—A**

3×10=30

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **three** marks.  
(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define longitudinal strain and lateral strain.
2. State the parallel axis theorem.
3. Calculate the moment of inertia of a thin uniform rod of mass 100 kg and length 60 cm about an axis perpendicular to its length and passing through its centre.
4. Describe the terms cantilever beam and overhanging beam.
5. Define (a) point load and (b) uniformly distributed load.
6. List the classification of manometers.
7. Define viscosity.
8. Differentiate between steady and unsteady flow.
9. Define pump and list any three types of oil pumps.
10. State any three merits of a hydraulic control system over pneumatic control system.

**PART—B**

8×5=40

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **eight** marks.  
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

- 11.** (a) A steel rod 24 mm diameter and 500 mm length is subjected to an axial pull of 30 kN. Determine the stress and elongation when  $E = 2 \times 10^5 \text{ N/mm}^2$ .

**(OR)**

- (b) A hollow circular shaft 200 mm external diameter, thickness of metal 20 mm is to transmit 1500 kW at 160 rpm. Calculate the angle of twist in a length of 5 m. Take  $G = 0.8503 \times 10^5 \text{ N/mm}^2$ .

- 12.** (a) Find the moment of inertia of a T-section having flange and web both 120 mm × 30 mm about an axis passing through the centre of gravity of the section.

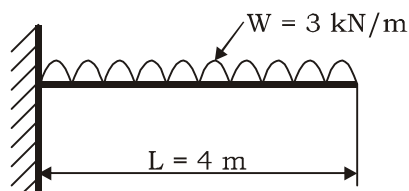
**(OR)**

- (b) An I-section made up of top and bottom flange 90 mm × 15 mm and web 110 mm × 25 mm. Determine  $I_{xx}$  of the section.

- 13.** (a) A beam of length 1.2 m is simply supported at its ends and carries two point loads of 2.5 kN and 3 kN at distances of 0.4 m and 0.8 m from the left end support. Draw shear force and bending moment diagrams.

**(OR)**

- (b) Draw shear force and bending moment diagrams for the following cantilever beam.



- 14.** (a) Explain about U-tube manometer with a neat sketch.

**(OR)**

(b) One end of a U-tube manometer is connected to pipeline carrying water and other end is open to atmosphere. The level of mercury in the right limb is 0.12 m above the centre of pipe and the level of mercury in the left limb connected to the pipeline is 0.2 m below the centre of the pipeline. Find the pressure of water in the pipe.

15. (a) (i) Differentiate between laminar and turbulent flows.  
(ii) Explain the working principle of hydraulic jack with a neat sketch.

**(OR)**

- (b) (i) Write and explain the continuity equation of flow.  
(ii) Explain the working principle of hydraulic press with a neat sketch.

**PART—C**

10×1=10

- Instructions :** (1) Answer the following question.  
(2) The question carries **ten** marks.  
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. (a) State the assumptions made in the deriving of Bernoulli's equation.  
(b) Write the limitations of Bernoulli's equation.

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