TED (15/19) – 4021
(Revision – 2015/19)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, NOVEMBER – 2024

APPLIED MECHANICS & STRENGTH OF MATERIALS

[Maximum Marks : 100] [Time : 3 hours]

PART – A
(Maximum Marks : 10)

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

1. State Hook's Law.
2. Define static friction.
3. Define radius of gyration.
4. What is polar moment of inertia?
5. Define slenderness ratio. (5x2=10)

PART – B
(Maximum Marks : 30)

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

1. Draw stress strain diagram for a brittle material and mark the significant points.
2. Define volumetric strain and bulk modulus.
3. Derive the expression for the moment of inertia of a rectangular section having depth 'D' and breadth 'B' about horizontal axis.
4. List different types of welded joints.
5. Define stresses in a thin cylinder subjected to an internal pressure.
6. Define the terms spring index and stiffness.
7. State Rankine's formula. (5x6=30)

PART – C
(Maximum Marks : 60)
(Answer **one full** question from each unit. Each full question carries 15 marks)

UNIT – I

III. (a) Explain the shear stress and shear strain. (6)

(b) Determine the change in volume of a metal bar 400 mm long 60 mm wide and 50 mm thick subjected to a pull of 300 kN in the direction of its length. Take E = 2.1 x 10^5 N/mm^2 and μ = 0.3. (9)

OR

IV. (a) Define thermal stress and strain. (6)

(b) The new rails in track are laid at a temperature of 12^0 with 3 mm gap at each end. The rails were 10 m long. During the summer the temperature rises to 45°C. Determine the intensity of stress developed. The coefficient of thermal expansion is 12 x 10^{-6}/°C and modulus of elasticity as 2 x 10^5N/mm^2. (9)

UNIT – II

V. (a) Explain parallel axis theorem. (6)

(b) A block weighs 500 N dragged upon a plane inclined at an angle 30° to the horizontal. A force of 400 N inclined at 20° with the plane can just move it up the plane. Find normal reaction and coefficient of friction. (9)

OR

VI. (a) State the laws of static friction. (6)

(b) Find the centre of gravity of the shaded section shown in fig 1. All dimensions are in mm. (9)

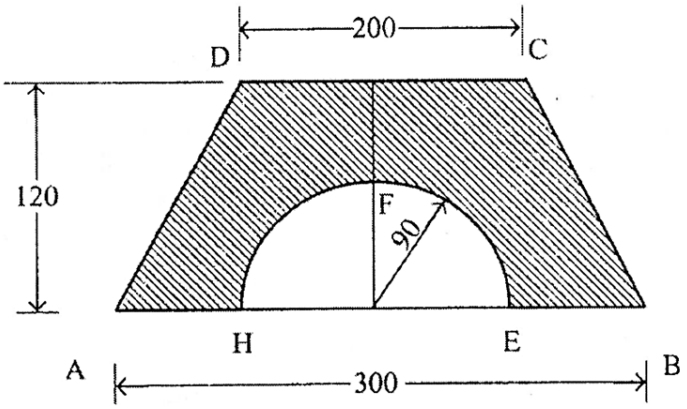

Fig 1

UNIT –III

VII. (a) Explain the failure of riveted joints. (6)

(b) A solid shaft running at 250 rpm transmits 150 kW. Find the suitable diameter of shaft, if the shear stress produced is 80 N/mm^2. (9)

OR

VIII. (a) Illustrate caulking and fullering process. (6)

(b) A fluid under a pressure of 3 N/mm^2 is contained in seamless pipe of 400 mm diameter. If the permissible stress be 120 N/mm^2, find the minimum thickness of the pipe. (9)

UNIT – IV

IX. (a) Distinguish between closely coiled and open coiled helical spring. (6)

(b) Draw shear force and bending moment diagram of a simply supported beam shown in fig 2. (9)

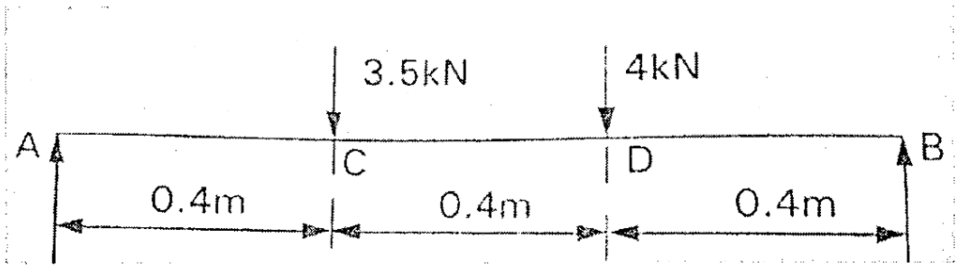

Fig.2

OR

X. (a) Explain types of beams. (6)

(b) A simply supported beam has a rectangular section 150 mm wide and 300 mm deep. The span is 3 meters and carrying uniformly distributed load of 6000N. If the $E = 0.1 \times 10^5 N/mm^2$. Calculate the maximum defection. (9)

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