GX497

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

FIRST SEMESTER EXAMINATIONS 2000

FIRST CIVIL ENGINEERING EXAMINATION
FIRST UNDENOMINATED ENGINEERING EXAMINATION

FUNDAMENTALS OF CIVIL ENGINEERING

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Time allowed: **2** hours
Answer 4 questions

1. Determine the support reactions and find the forces in the members of the pin-jointed truss shown in Figure Q1. (20 marks)

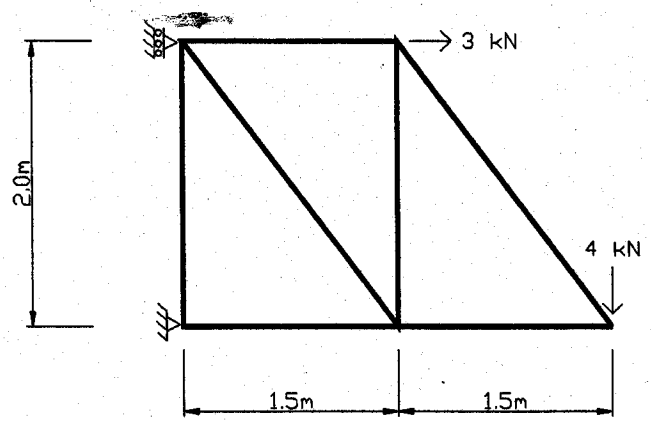

Figure Q1

If the maximum allowable stress in the truss material is 100 N/mm^2, determine the minimum member size. (5 marks)

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2. (a) Distinguish between:
   (i) Homogenous materials and isotropic materials (5 marks)
   (ii) Material strength and material stiffness (5 marks)
   (iii) Stress and strain (5 marks)

   (b) Discuss the significance of adding carbon to iron (10 marks)

3. A hydraulic cylinder with a 110 mm diameter bore is used as a hoisting mechanism in a dump truck. The cylinder is pin connected at both ends and there is also a pin connection at A. The combined mass of the dumper and its load is 25000 kg and it acts through the center of mass as shown (CM). Determine the cylinder pressure required to support the load in the positions shown in Figure Q3. (25 marks)

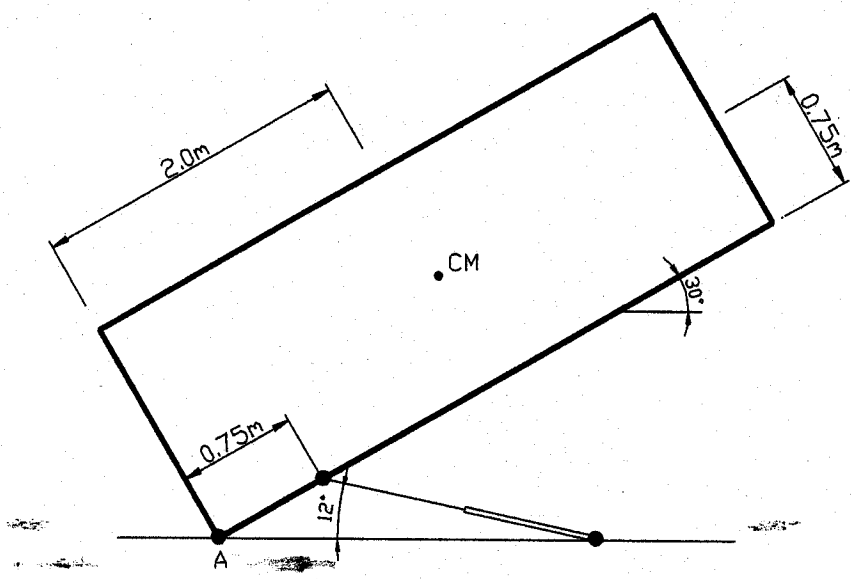

Figure Q3

4. (a) Define the terms:
   (i) Laminar flow (3 marks)
   (ii) Turbulent flow (3 marks)
   (iii) Steady flow (3 marks)
   (iv) Viscosity (3 marks)
   (v) Boundary layer (3 marks)

   (b) Water is flowing through a 150 mm diameter pipe at the rate of 0.1 m^3/sec. Determine the diameter reduction necessary to increase the velocity by a factor of two (10 marks).

5. "The Civil Engineer of today must have a thorough understanding of the design process" – discuss. (25 marks)