II B.Tech I Semester Examinations,May/June 2012
FOUNDATION OF SOLID MECHANICS
Aeronautical Engineering

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. Find the size of the fillet weld required to connect the bracket plate to the column as shown in figure 4. The stress in the weld is not to exceed 100 MPa.　　[16]
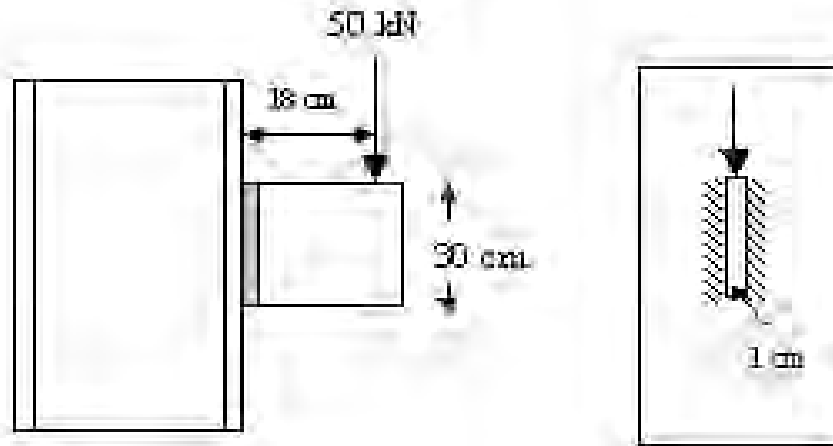

Figure 4

2. A beam of 5m span carries a u.d.l of 12kN/m and 2 concentrated loads of 15kN each equally spaced on the beam. Design the beam both for flesure and shear if the reaction is recangular, and depth is twice the width. Permissible stresses are $12N/mm^2$ in flexure and $1N/mm^2$ in shear.　　[16]

3. A beam of angle section 150 mm × 100 mm × 10 mm is simply supported over a span of 1.6m with 150 mm leg vertical. A uniformly distributed vertical load of 10 kN/m is applied throughout the span. Determine Maximum bending stress, Direction of neutral axis, Deflection at the center. Take: E = 210 GN/m^2.　　[16]

4. Find the maximum torque that can be safely applied to a shaft of 200 mm diameter if the permissible angle of twist is 10 in a length of 5 m and the permissible shear stress is 45 N/mm^2. Take N = 0.8× 10^5 N/mm^2.　　[16]

5. A water main 90 cm diameter contains water at a pressure head of 115 m. If the weight density of water is 9810 N/mm^2, find the thickness of the metal required for the water main, given the permissible stress as 22 N/mm^2.　　[16]

6. A cantilever 6m long carries a uniformly distributed load of 100N/m run and a concentrated load of 700N at the end of lever at B, 2m from free end A, as shown in figure 2. Draw S.F. and B.M. diagrams. Determine:
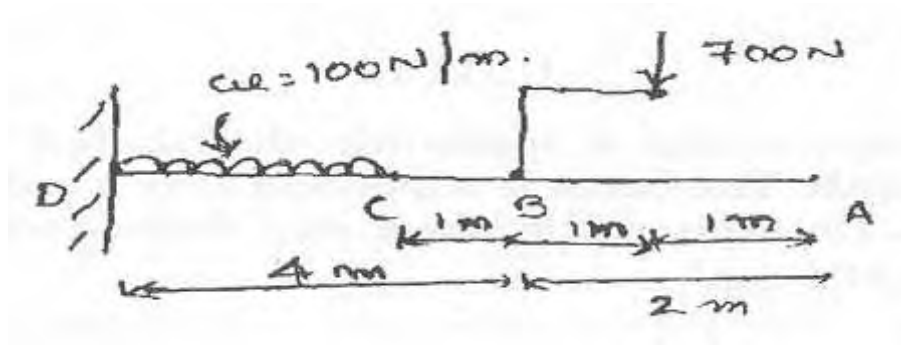
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Figure 2

   (a) Magnitude and position of maximum bending moment.

   (b) Position of the point of contra flexure.   [16]

7. Find the width and depth of the strongest beam that can be cut out of a cylindrical log of wood whose diameter is D. What is the ratio of depth to width of such a beam?   [16]

8. A beam of uniform rectangular section 100 mm wide and 240 mm deep is simply supported at its ends. It carries a uniformly distributed load of 9.125 kN/m run over the entire span of 4 m. Find the deflection at the centre if E $= 1.1 \times 10^4$ N/mm^2.   [16]

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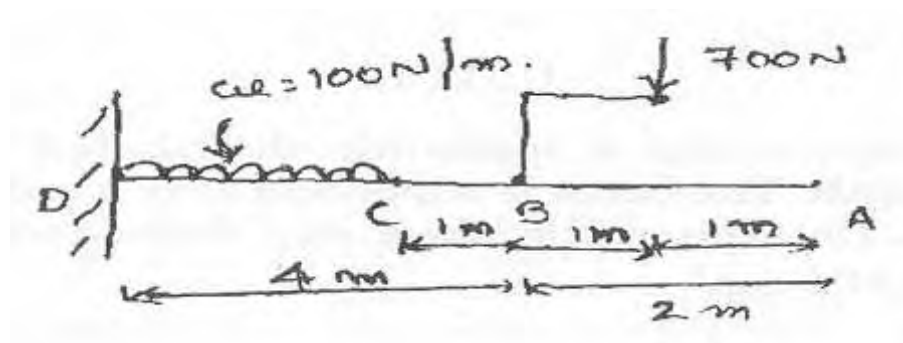

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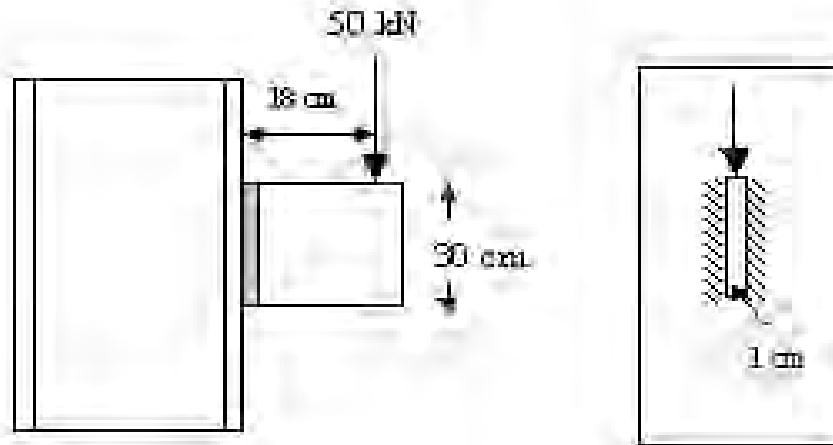

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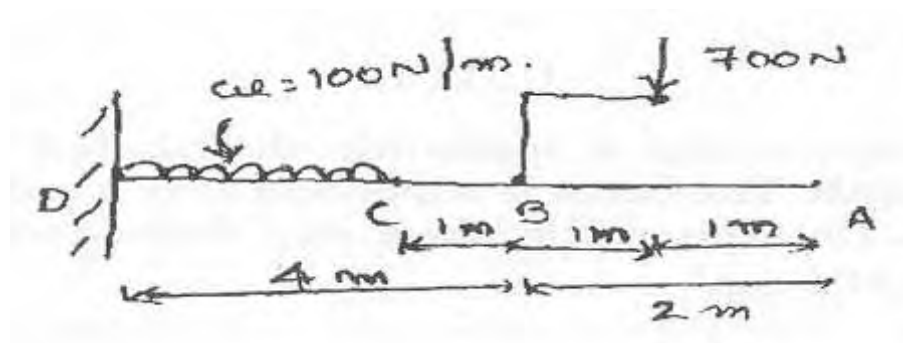

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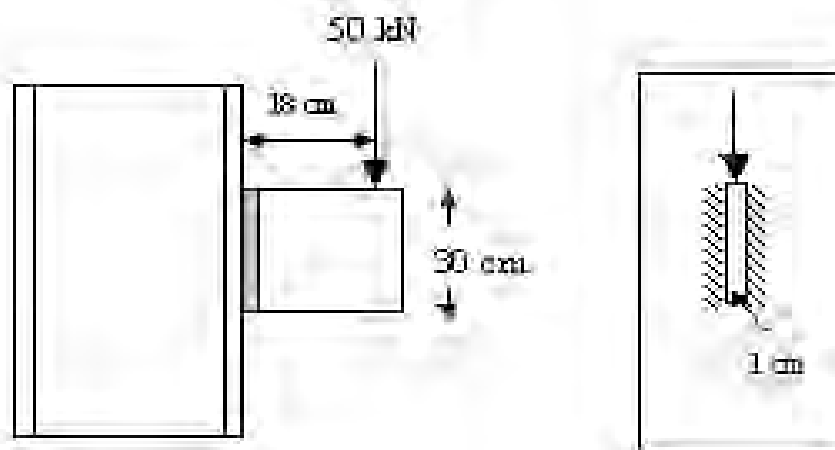

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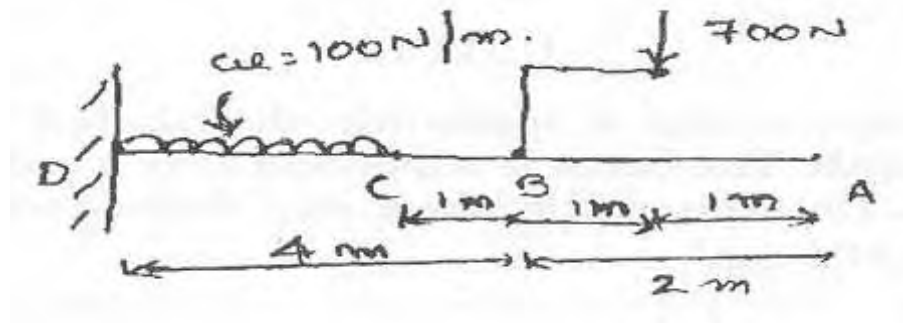

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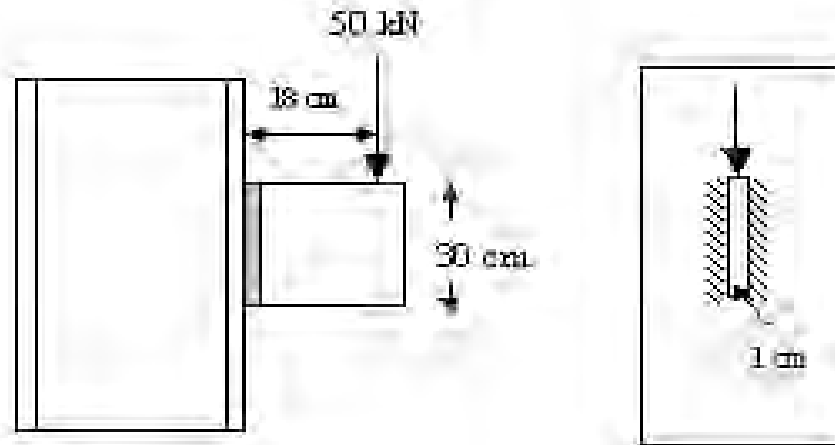
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