CODE NO: 07A3EC07   R07   SET - 1

II B.TECH - I SEMESTER EXAMINATIONS - MAY, 2011
MECHANICS OF SOLIDS
(COMMON TO ME, MECT, MEP, AME, MMT)

Time: 3hours   **Max. Marks: 80**

Answer any FIVE questions
All Questions Carry Equal Marks
- - -

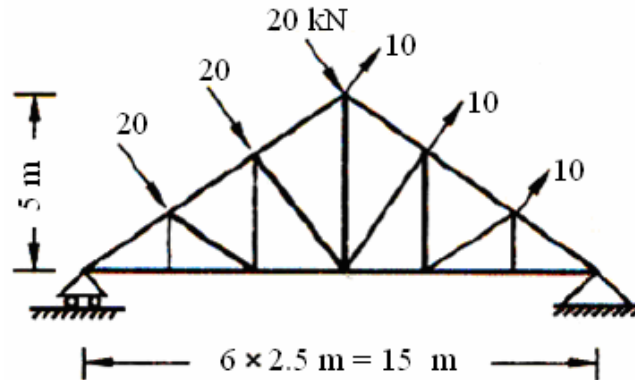1.   Analyze the truss indicated in the figure 1 by method of joints.   [16]

Figure 1:

2.   A water pipeline of 400.0 mm internal radius comprises segments simply supported over 6.0 m spans. Determine the minimum thickness of the pipe, if the allowable stresses in flexure and shear are 140.0 MPa and 100.0 MPa respectively. The effects of water pressure may be ignored.   [16]

3.   A compound cylinder comprises an inner tube of diameters 350.0 mm and 450.0mm, and an outer tube of diameters 400.0 mm and 500.0 mm. Determine the diametral interference required so that the final maximum stress in the tube does not exceed 180.0 MPa under an internal pressure of 55.0 MPa. Neglect the effects of longitudinal stresses. Assume E = 250.0 GPa.   [16]

4.   Design a mild steel boiler of 1.2 m diameter comprising a 2.7 m long cylindrical section with hemispherical ends to sustain an internal pressure of 2.0 MPa. Estimate the additional water required to keep the boiler full during working after it is filled at atmospheric pressure. Assume σ_s = 140:0MPa, Es=210.0GPa, υ=0:30 and K= 2.1 GPa for water. Design both welded and riveted joints assuming an allowable weld stress of 100.0 MPa and power driven shop rivets with 70% efficiency.   [16]

5.   Compute the maximum deflections and support rotations in the beams of the following figure 2 using
       (a) The methods of integration and
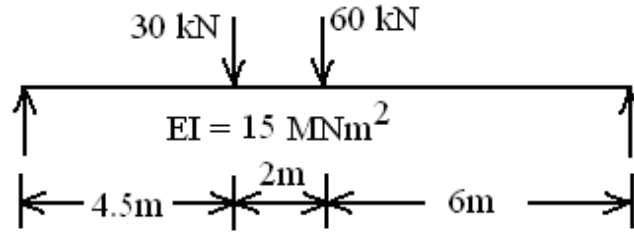   (b) The method of moment area.

figure 2

6.   A round bar of length L, tapering uniformly from a diameter D at one end to smaller diameter d at the other, is suspended vertically from the large end. If ρ is the unit mass, find the elongation caused by its own weight. Use this result to determine the elongation of a cone suspended from its base.   [16]

7.   Develop the shear stress distribution diagrams for the sections shown for the following figure 3 when subjected to a transverse S.F. of 200.0 kN. What are the maximum shear stresses?   [16]
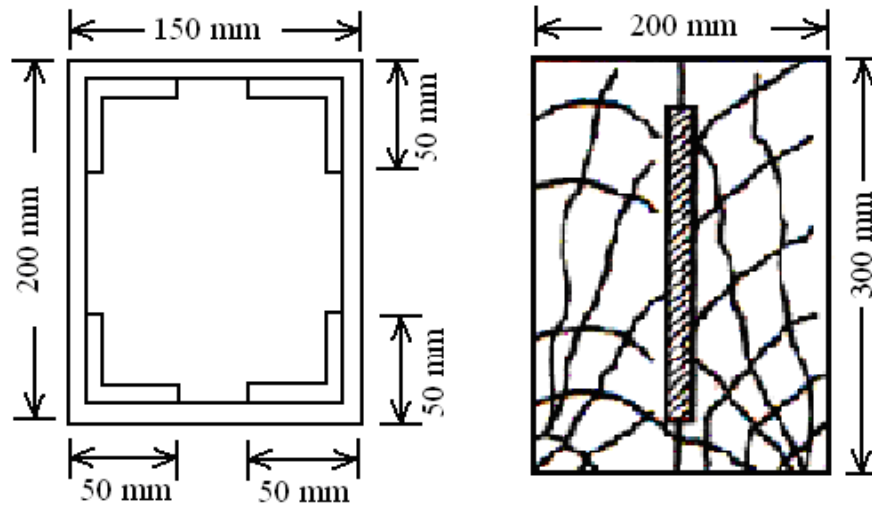

Figure 3:

8.   The following figure 4 indicates the Bending Moment diagram. Develop the loading and Shear force diagram for the beam.   [16]
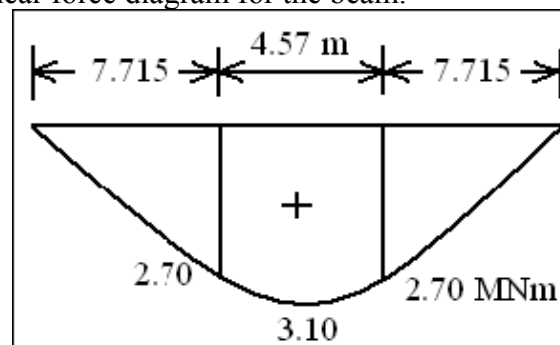

figure 4

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R07

SET - 2

II B.TECH - I SEMESTER EXAMINATIONS - MAY, 2011
MECHANICS OF SOLIDS
(COMMON TO ME, MECT, MEP, AME, MMT)

Time: 3hours   **Max. Marks: 80**

Answer any FIVE questions
All Questions Carry Equal Marks
- - -

1.   A compound cylinder comprises an inner tube of diameters 350.0 mm and 450.0mm, and an outer tube of diameters 400.0 mm and 500.0 mm. Determine the diametral interference required so that the final maximum stress in the tube does not exceed 180.0 MPa under an internal pressure of 55.0 MPa. Neglect the effects of longitudinal stresses. Assume E = 250.0 GPa.   [16]

2.   Design a mild steel boiler of 1.2 m diameter comprising a 2.7 m long cylindrical section with hemispherical ends to sustain an internal pressure of 2.0 MPa. Estimate the additional water required to keep the boiler full during working after it is filled at atmospheric pressure. Assume σ_s = 140:0MPa, Es=210.0GPa, υ=0:30 and K= 2.1 GPa for water. Design both welded and riveted joints assuming an allowable weld stress of 100.0 MPa and power driven shop rivets with 70% efficiency.   [16]

3.   Compute the maximum deflections and support rotations in the beams of the following figure 1 using
       (a) The methods of integration and
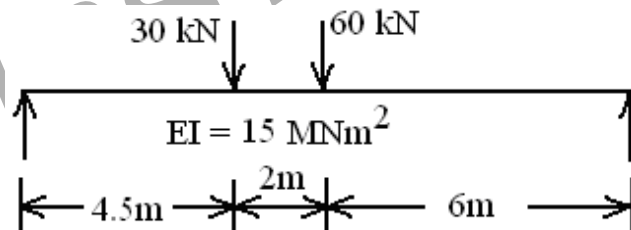   (b) The method of moment area.

figure 1

4.   A round bar of length L, tapering uniformly from a diameter D at one end to smaller diameter d at the other, is suspended vertically from the large end. If ρ is the unit mass, find the elongation caused by its own weight. Use this result to determine the elongation of a cone suspended from its base.   [16]

5.   Develop the shear stress distribution diagrams for the sections shown for the following figure 2 when subjected to a transverse S.F. of 200.0 kN. What are the maximum shear stresses?   [16]
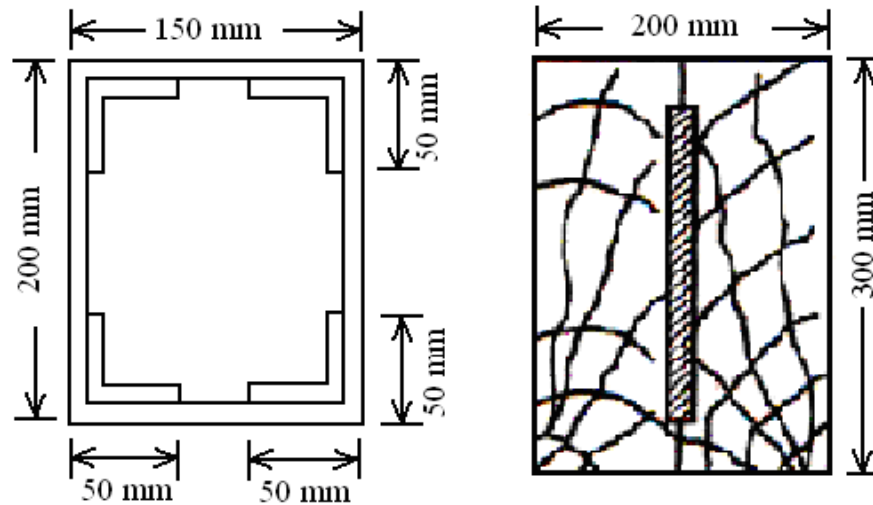
Figure 2:

6. The following figure 3 indicates the Bending Moment diagram. Develop the loading and Shear force diagram for the beam. [16]
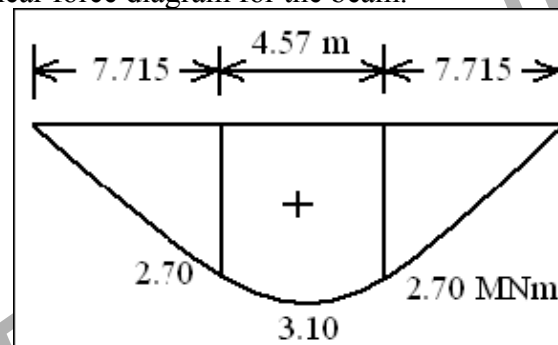

figure 3

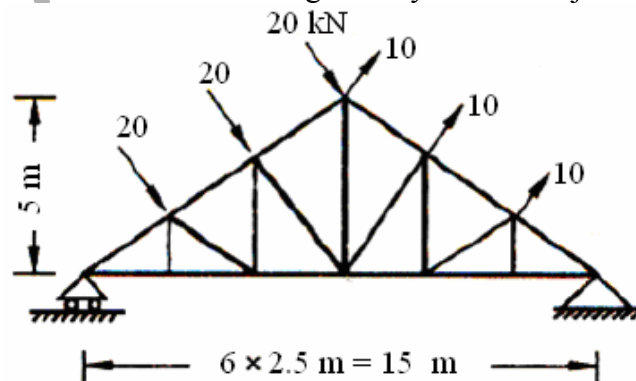7. Analyze the truss indicated in the figure 4 by method of joints. [16]

Figure 4:

8. A water pipeline of 400.0 mm internal radius comprises segments simply supported over 6.0 m spans. Determine the minimum thickness of the pipe, if the allowable stresses in flexure and shear are 140.0 MPa and 100.0 MPa respectively. The effects of water pressure may be ignored. [16]

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SET - 3

II B.TECH - I SEMESTER EXAMINATIONS - MAY, 2011
MECHANICS OF SOLIDS
(COMMON TO ME, MECT, MEP, AME, MMT)

Time: 3hours   **Max. Marks: 80**

Answer any FIVE questions
All Questions Carry Equal Marks
- - -

1. Compute the maximum deflections and support rotations in the beams of the following figure 1 using
    (a) The methods of integration and
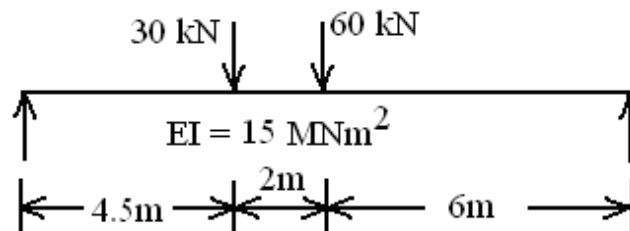   (b) The method of moment area.

figure 1

2. A round bar of length L, tapering uniformly from a diameter D at one end to smaller diameter d at the other, is suspended vertically from the large end. If ρ is the unit mass, find the elongation caused by its own weight. Use this result to determine the elongation of a cone suspended from its base.   [16]

3. Develop the shear stress distribution diagrams for the sections shown for the following figure 2 when subjected to a transverse S.F. of 200.0 kN. What are the maximum shear stresses?   [16]
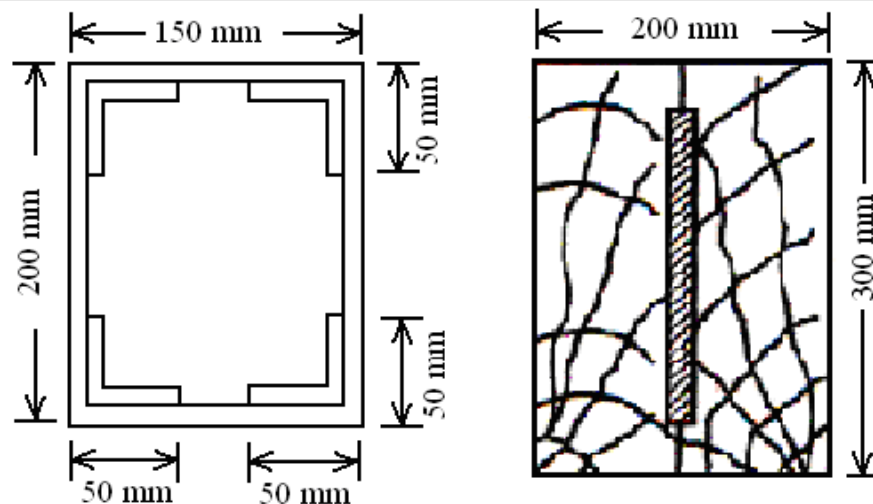

Figure 2:

4. The following figure 3 indicates the Bending Moment diagram. Develop the loading and Shear force diagram for the beam. [16]
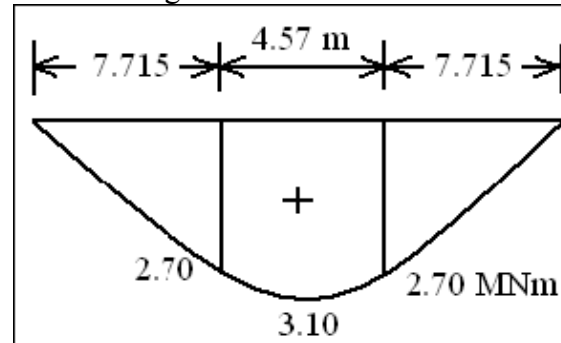

figure 3

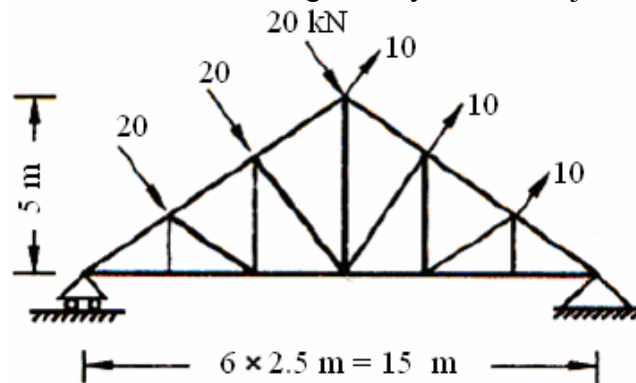5. Analyze the truss indicated in the figure 4 by method of joints. [16]

Figure 4:

6. A water pipeline of 400.0 mm internal radius comprises segments simply supported over 6.0 m spans. Determine the minimum thickness of the pipe, if the allowable stresses in flexure and shear are 140.0 MPa and 100.0 MPa respectively. The effects of water pressure may be ignored. [16]

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SET - 4

II B.TECH - I SEMESTER EXAMINATIONS - MAY, 2011
MECHANICS OF SOLIDS
(COMMON TO ME, MECT, MEP, AME, MMT)

Time: 3hours

Max. Marks: 80

Answer any FIVE questions
All Questions Carry Equal Marks
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1. Develop the shear stress distribution diagrams for the sections shown for the following figure 1 when subjected to a transverse S.F. of 200.0 kN. What are the maximum shear stresses? [16]
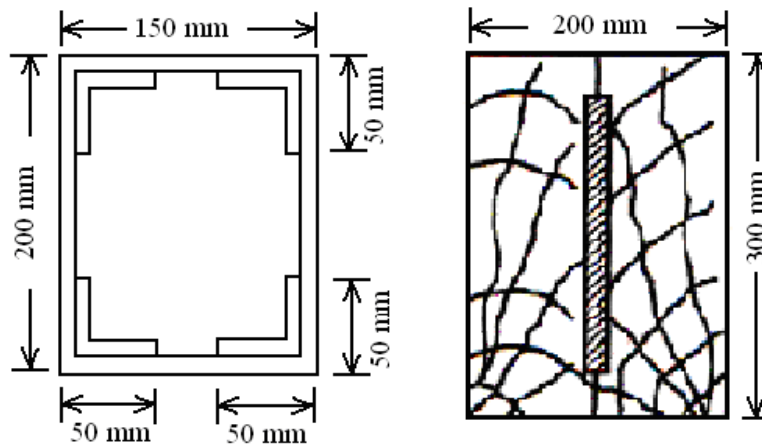

Figure 1:

2. The following figure 2 indicates the Bending Moment diagram. Develop the loading and Shear force diagram for the beam. [16]
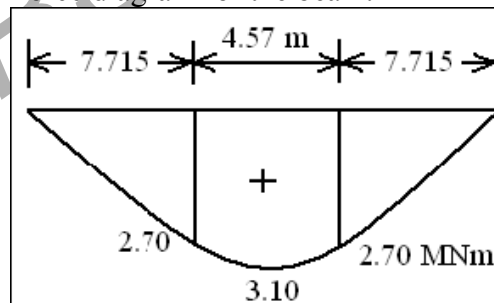

figure 2

3. Analyze the truss indicated in the figure 3 by method of joints. [16]
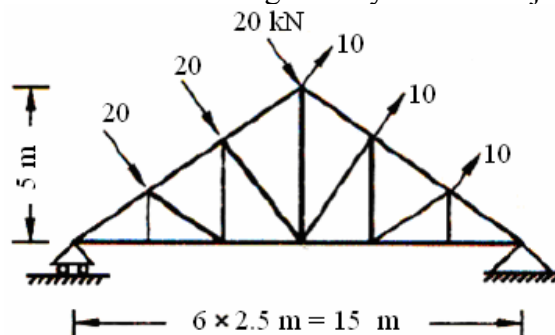

Figure 3:

4. A water pipeline of 400.0 mm internal radius comprises segments simply supported over 6.0 m spans. Determine the minimum thickness of the pipe, if the allowable stresses in flexure and shear are 140.0 MPa and 100.0 MPa respectively. The effects of water pressure may be ignored.   [16]

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7. Compute the maximum deflections and support rotations in the beams of the following figure 4 using
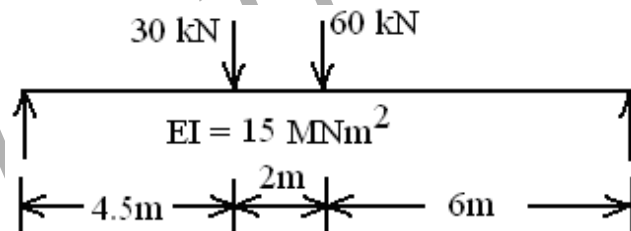   (a) The methods of integration and
    (b) The method of moment area.

figure 4

8. A round bar of length L, tapering uniformly from a diameter D at one end to smaller diameter d at the other, is suspended vertically from the large end. If ρ is the unit mass, find the elongation caused by its own weight. Use this result to determine the elongation of a cone suspended from its base.   [16]

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