Code No: 07A30101 **R07** **Set No. 2**

II B.Tech I Semester Examinations,May 2011
STRENGTH OF MATERIALS - I
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A vertical round steel rod 2 metre long is securely held at its upper end. A weight can slide freely on the rod and its fall is arrested by a stop provided at the lower end of the rod. When the weight falls from a height of 25 mm above the stop the maximum stress reached in the rod is estimated to be 150 N/mm^2. Determine the stress in the rod if the load had been applied gradually and also the minimum stress if the load had fallen from height of 50 mm. Take E = 2.1 $\times$ 10^5 N/mm^2. [16]

2. (a) Derive a relation for the hoop stress at the junction of a compound thick cylindrical shell. Use general notation.
   (b) A long steel tube, 80 mm internal diameter and 1.5 mm thick has closed ends and is subjected to an internal fluid pressure of 2.5 N/mm^2. Taking E = 2$\times$10^5 N/mm^2 and μ = 0.29, estimate the percentage increase in the internal volume of the tube. [8+8]

3. A compound tube consists of a steel tube 140 mm internal diameter and 160 mm external diameter and an outer brass tube 160 mm internal diameter and 180 mm external diameter. The two tubes are of the same length. The compound tube carries an axial load of 900 kN. Find the stresses and the load carried by each tube and the amount it shortens. Length of each tube is 140 mm. Take E for steel as 2$\times$ 10^5 N/mm^2 and for brass as 1 $\times$ 10^5 N/mm^2. [16]

4. Show the shear stress variation in the following sections.
   (a) Rectangle
   (b) Solid circle. [8+8]

5. Draw the S.F. and B.M. diagrams for the beam which is loaded as shown in Figure 8. Determine the points of contraflexure within the span AB. [16]

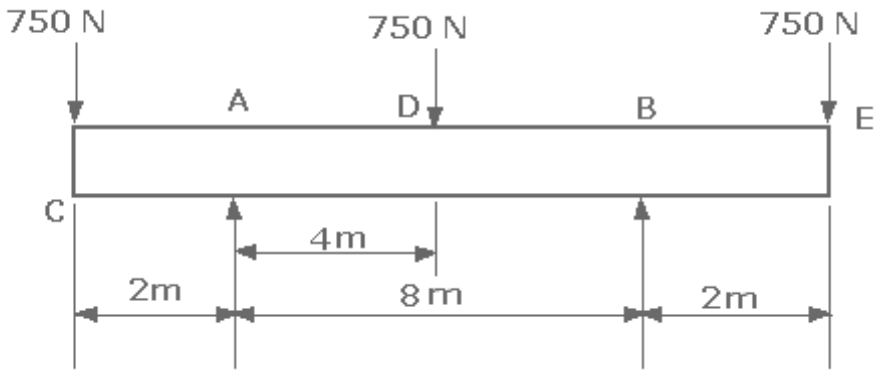

Figure 8

6. A beam of length 20 m is simply supported at its ends and carries two point loads of 4 kN and 10 kN at a distance of 8 m and 12 m from left end respectively. Calculate:

   (a) deflection under each load

   (b) maximum deflection.
   Take E = 2×10^6 N/mm^2 and I = 1×10^9 mm^4. [16]

7. A beam is of square section of the side 'a'. If the permissible bending stress is 'α'. If the permissible bending stress is 'σ' find the moment of resistance when the beam section is placed such that:

   (a) Two sides are horizontal,

   (b) One diagonal is vertical. Find also the ratio of the moments of the resistance of the section in the two positions. [16]

8. A built up cylindrical shell of 300 mm diameter, 3 m long and 6 mm thick is subjected to an internal pressure of 2 MN/m^2. Calculate the change in length, diameter and volume of the cylinder under that pressure if the efficiencies of the longitudinal and circumferential joint are 80% and 50% respectively.
   Take, E = 200 GN/m^2; $\mu = 0.3$. [16]

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Code No: 07A30101 **R07** **Set No. 4**

II B.Tech I Semester Examinations,May 2011
STRENGTH OF MATERIALS - I
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Show the shear stress variation in the following sections.
   (a) Rectangle
   (b) Solid circle. [8+8]

2. A compound tube consists of a steel tube 140 mm internal diameter and 160 mm external diameter and an outer brass tube 160 mm internal diameter and 180 mm external diameter. The two tubes are of the same length. The compound tube carries an axial load of 900 kN. Find the stresses and the load carried by each tube and the amount it shortens. Length of each tube is 140 mm. Take E for steel as 2×10^5 N/mm^2 and for brass as 1×10^5 N/mm^2. [16]

3. Draw the S.F. and B.M. diagrams for the beam which is loaded as shown in Figure 8. Determine the points of contraflexure within the span AB. [16]

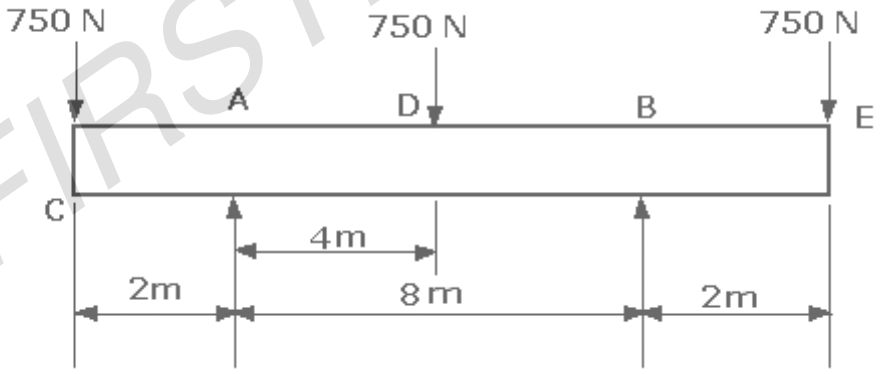

Figure 8

4. A beam of length 20 m is simply supported at its ends and carries two point loads of 4 kN and 10 kN at a distance of 8 m and 12 m from left end respectively. Calculate:
   (a) deflection under each load
   (b) maximum deflection.
   Take E = 2×10^6 N/mm^2 and I = 1×10^9 mm^4. [16]

5. (a) Derive a relation for the hoop stress at the junction of a compound thick cylindrical shell. Use general notation.
   (b) A long steel tube, 80 mm internal diameter and 1.5 mm thick has closed ends and is subjected to an internal fluid pressure of 2.5 N/mm^2. Taking E = 2×10^5 N/mm^2 and $\mu = 0.29$, estimate the percentage increase in the internal volume of the tube. [8+8]

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   (a) Two sides are horizontal,

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8. A built up cylindrical shell of 300 mm diameter, 3 m long and 6 mm thick is subjected to an internal pressure of 2 MN/m^2. Calculate the change in length, diameter and volume of the cylinder under that pressure if the efficiencies of the longitudinal and circumferential joint are 80% and 50% respectively.
   Take, E = 200 GN/m^2; μ = 0.3. [16]

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Code No: 07A30101 **R07** **Set No. 1**

II B.Tech I Semester Examinations,May 2011
STRENGTH OF MATERIALS - I
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A beam of length 20 m is simply supported at its ends and carries two point loads of 4 kN and 10 kN at a distance of 8 m and 12 m from left end respectively. Calculate:
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4. A beam is of square section of the side 'a'. If the permissible bending stress is 'α'. If the permissible bending stress is 'σ' find the moment of resistance when the beam section is placed such that:
   (a) Two sides are horizontal,
   (b) One diagonal is vertical. Find also the ratio of the moments of the resistance of the section in the two positions. [16]

5. (a) Derive a relation for the hoop stress at the junction of a compound thick cylindrical shell. Use general notation.
   (b) A long steel tube, 80 mm internal diameter and 1.5 mm thick has closed ends and is subjected to an internal fluid pressure of 2.5 N/mm^2. Taking E = 2×10^5 N/mm^2 and $\mu = 0.29$, estimate the percentage increase in the internal volume of the tube. [8+8]

6. Show the shear stress variation in the following sections.
   (a) Rectangle
   (b) Solid circle. [8+8]

Code No: 07A30101 **R07** **Set No. 1**

7. A compound tube consists of a steel tube 140 mm internal diameter and 160 mm external diameter and an outer brass tube 160 mm internal diameter and 180 mm external diameter. The two tubes are of the same length. The compound tube carries an axial load of 900 kN. Find the stresses and the load carried by each tube and the amount it shortens. Length of each tube is 140 mm. Take E for steel as 2×10^5 N/mm^2 and for brass as 1×10^5 N/mm^2. [16]

8. Draw the S.F. and B.M. diagrams for the beam which is loaded as shown in Figure 8. Determine the points of contraflexure within the span AB. [16]

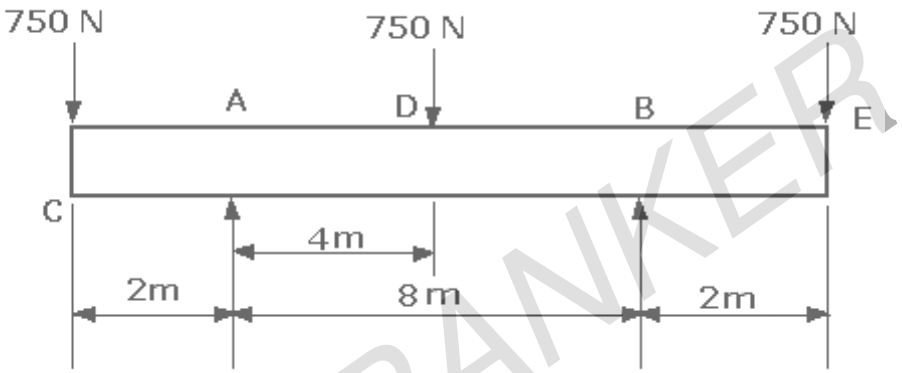

Figure 8

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Code No: 07A30101 **R07** **Set No. 3**

II B.Tech I Semester Examinations,May 2011
STRENGTH OF MATERIALS - I
Civil Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A built up cylindrical shell of 300 mm diameter, 3 m long and 6 mm thick is subjected to an internal pressure of 2 MN/m^2. Calculate the change in length, diameter and volume of the cylinder under that pressure if the efficiencies of the longitudinal and circumferential joint are 80% and 50% respectively. Take, E = 200 GN/m^2; $\mu = 0.3$. [16]

2. A compound tube consists of a steel tube 140 mm internal diameter and 160 mm external diameter and an outer brass tube 160 mm internal diameter and 180 mm external diameter. The two tubes are of the same length. The compound tube carries an axial load of 900 kN. Find the stresses and the load carried by each tube and the amount it shortens. Length of each tube is 140 mm. Take E for steel as 2×10^5 N/mm^2 and for brass as 1×10^5 N/mm^2. [16]

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   (a) Two sides are horizontal,
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4. A beam of length 20 m is simply supported at its ends and carries two point loads of 4 kN and 10 kN at a distance of 8 m and 12 m from left end respectively. Calculate:
   (a) deflection under each load
   (b) maximum deflection.
   Take E = 2×10^6 N/mm^2 and I = 1×10^9 mm^4. [16]

5. Show the shear stress variation in the following sections.
   (a) Rectangle
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6. (a) Derive a relation for the hoop stress at the junction of a compound thick cylindrical shell. Use general notation.
   (b) A long steel tube, 80 mm internal diameter and 1.5 mm thick has closed ends and is subjected to an internal fluid pressure of 2.5 N/mm^2. Taking E = 2×10^5 N/mm^2 and $\mu = 0.29$, estimate the percentage increase in the internal volume of the tube. [8+8]

Code No: 07A30101 **R07** **Set No. 3**

7. A vertical round steel rod 2 metre long is securely held at its upper end. A weight can slide freely on the rod and its fall is arrested by a stop provided at the lower end of the rod. When the weight falls from a height of 25 mm above the stop the maximum stress reached in the rod is estimated to be 150 N/mm^2. Determine the stress in the rod if the load had been applied gradually and also the minimum stress if the load had fallen from height of 50 mm. Take E = 2.1 $\times$ 10^5 N/mm^2. [16]

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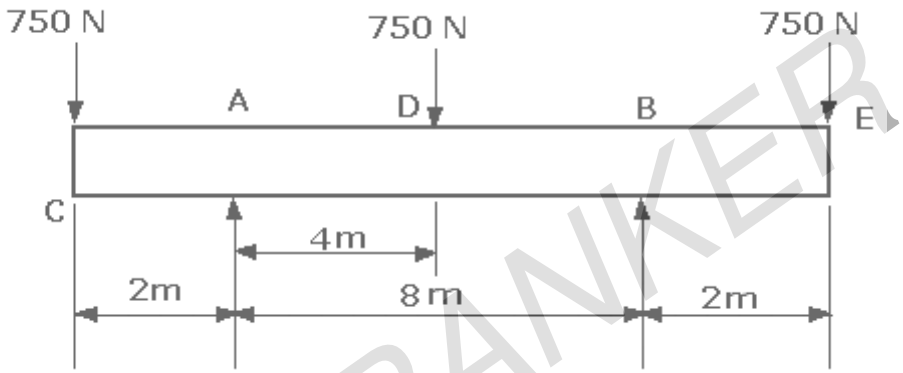

Figure 8

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