Code No: R05210303 **R05** **Set No. 2**

**II B.Tech I Semester Examinations,November 2010**
**MECHANICS OF SOLIDS**
**Common to ME, MECT, MEP, AE, AME, MMT**

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

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

⋆⋆⋆⋆⋆

1. (a) Sketch the variation of shear stress across the depth of the beam of the following cross sections.
   i. T - section and [3]
   ii. Square section with diagonal vertical. [3]
   iii. Circular section. [3]

   (b) An I section is having overall depth as 550mm and overall width as 200mm. The thickness of the flanges is 25mm where as the thickness of the web is 20mm. If the section carries a shear force of 45kN, calculate the shear stress values at salient points and draw the sketch showing variation of shear stress. [7]

2. Analyse the frame shown in Figure 7. [16]

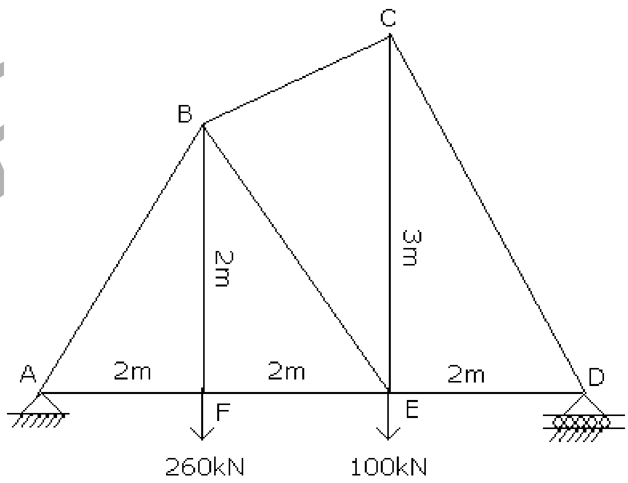


Figure 7

3. (a) State the assumptions involved in the theory of simple bending. [6]

   (b) A simply supported Symmetric I - section has flanges of size 200mm × 15mm and its overall depth is 520mm. Thickness of web is 10mm. It is strengthened with a plate of size 250mm × 12mm on compression side. Find the moment of resistance of the section if permissible stress is 160MPa. How much uniformly distributed load it can carry if it is used as a cantilever of span 3.6m. [10]

4. A compound cylinder is formed by shrinking one tube on to another, the final dimensions being internal dia. 160mm, external dia. 240mm and dia. at junction 200cm. If after shrinking on the radial pressure at the common surface is $10N/mm^2$,

Calculate the initial stresses set up across the section if now fluid under a pressure of $80N/mm^2$, is admitted inside the compound tube, calculate the final stresses set up across the section. Sketch the variation of stresses across the thickness of compound tube at different stages. [16]

5. Sketch the shear force and bending moment diagrams showing the salient values for the loaded beam shown in the figure1 below. [16]

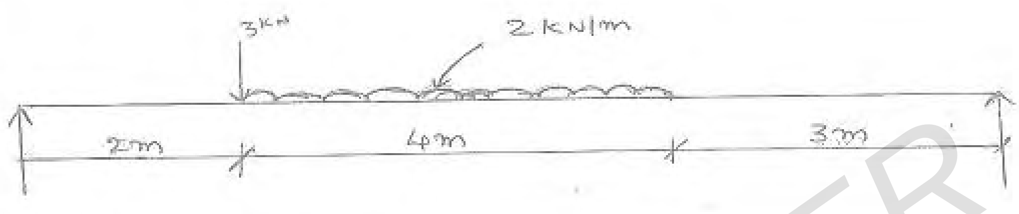


Figure 1

6. (a) Derive relation between three elastic moduli. [8]

   (b) Draw stress - strain diagram for mild steel. Indicate salient points and define them. [8]

7. Derive an expression for calculating the thickness of the thin cylindrical shell and solve the following problem. A thin cylindrical shell of 1.2 m diameter is subjected to an internal pressure of 1.2 N/mm$^2$. If the tensile strength of the plate is 415 N/mm$^2$ and factor of safety is 4, then calculate the suitable thickness of the shell. [16]

8. A simply supported beam A B of span 6 meters and of flexural rigidity EI = 8 $\times 10^4 kN - m^2$ is subjected to a clockwise couple of 60 kN-m at a distance of 4 m from the left end.

   Find the deflection at the point of application of the couple and the maximum deflection and slope. [16 ]

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Code No: R05210303 **R05** **Set No. 4**

**II B.Tech I Semester Examinations,November 2010**
**MECHANICS OF SOLIDS**
**Common to ME, MECT, MEP, AE, AME, MMT**

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

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

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1. A compound cylinder is formed by shrinking one tube on to another, the final dimensions being internal dia. 160mm, external dia. 240mm and dia. at junction 200cm. If after shrinking on the radial pressure at the common surface is $10N/mm^2$, Calculate the initial stresses set up across the section if now fluid under a pressure of $80N/mm^2$, is admitted inside the compound tube, calculate the final stresses set up across the section. Sketch the variation of stresses across the thickness of compound tube at different stages. [16]

2. (a) State the assumptions involved in the theory of simple bending. [6]
   (b) A simply supported Symmetric I - section has flanges of size 200mm $\times$ 15mm and its overall depth is 520mm. Thickness of web is 10mm. It is strengthened with a plate of size 250mm $\times$ 12mm on compression side. Find the moment of resistance of the section if permissible stress is 160MPa. How much uniformly distributed load it can carry if it is used as a cantilever of span 3.6m. [10]

3. (a) Derive relation between three elastic moduli. [8]
   (b) Draw stress - strain diagram for mild steel. Indicate salient points and define them. [8]

4. (a) Sketch the variation of shear stress across the depth of the beam of the following cross sections.
      i. T - section and [3]
      ii. Square section with diagonal vertical. [3]
      iii. Circular section. [3]
   (b) An I section is having overall depth as 550mm and overall width as 200mm. The thickness of the flanges is 25mm where as the thickness of the web is 20mm. If the section carries a shear force of 45kN, calculate the shear stress values at salient points and draw the sketch showing variation of shear stress. [7]

5. A simply supported beam A B of span 6 meters and of flexural rigidity EI = 8 $\times 10^4 kN - m^2$ is subjected to a clockwise couple of 60 kN-m at a distance of 4 m from the left end.

   Find the deflection at the point of application of the couple and the maximum deflection and slope. [16 ]

6. Analyse the frame shown in Figure 7. [16]

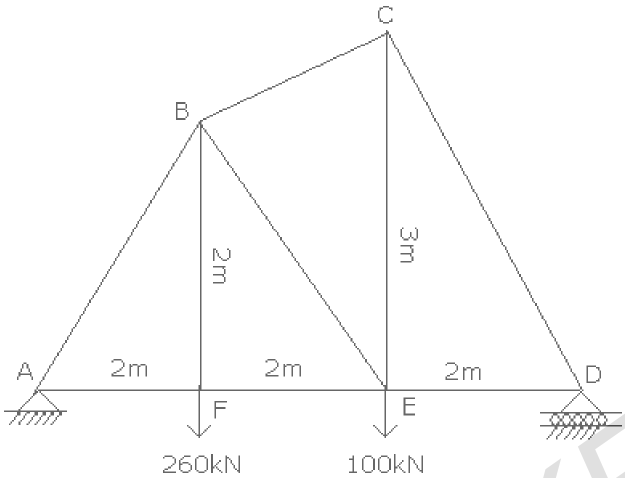


Figure 7

7. Derive an expression for calculating the thickness of the thin cylindrical shell and solve the following problem. A thin cylindrical shell of 1.2 m diameter is subjected to an internal pressure of 1.2 N/mm$^2$. If the tensile strength of the plate is 415 N/mm$^2$ and factor of safety is 4, then calculate the suitable thickness of the shell. [16]

8. Sketch the shear force and bending moment diagrams showing the salient values for the loaded beam shown in the figure1 below. [16]

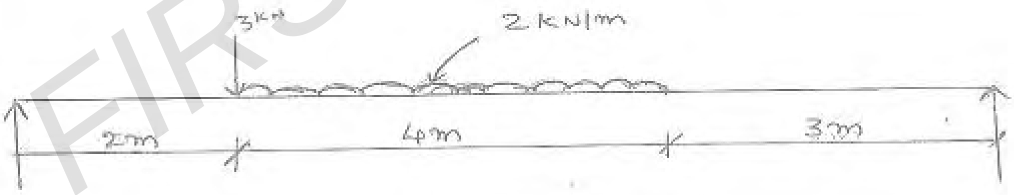


Figure 1

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Code No: R05210303 **R05** **Set No. 1**

**II B.Tech I Semester Examinations,November 2010**
**MECHANICS OF SOLIDS**
**Common to ME, MECT, MEP, AE, AME, MMT**

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

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

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1. (a) Derive relation between three elastic moduli. [8]
   (b) Draw stress - strain diagram for mild steel. Indicate salient points and define them. [8]

2. A simply supported beam A B of span 6 meters and of flexural rigidity EI = 8 $\times 10^4 kN - m^2$ is subjected to a clockwise couple of 60 kN-m at a distance of 4 m from the left end.

   Find the deflection at the point of application of the couple and the maximum deflection and slope. [16 ]

3. Analyse the frame shown in Figure 7. [16]

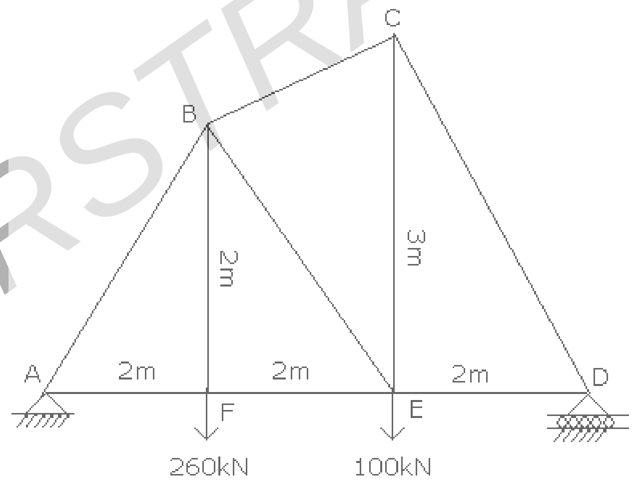


Figure 7

4. A compound cylinder is formed by shrinking one tube on to another, the final dimensions being internal dia. 160mm, external dia. 240mm and dia. at junction 200cm. If after shrinking on the radial pressure at the common surface is $10N/mm^2$, Calculate the initial stresses set up across the section if now fluid under a pressure of $80N/mm^2$, is admitted inside the compound tube, calculate the final stresses set up across the section. Sketch the variation of stresses across the thickness of compound tube at different stages. [16]

5. Derive an expression for calculating the thickness of the thin cylindrical shell and solve the following problem. A thin cylindrical shell of 1.2 m diameter is subjected to an internal pressure of 1.2 N/mm$^2$. If the tensile strength of the plate is 415 N/mm$^2$ and factor of safety is 4, then calculate the suitable thickness of the shell. [16]

6. Sketch the shear force and bending moment diagrams showing the salient values for the loaded beam shown in the figure1 below. [16]

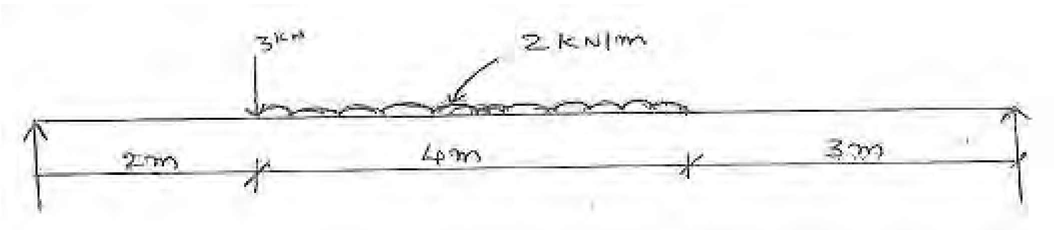


Figure 1

7. (a) Sketch the variation of shear stress across the depth of the beam of the following cross sections.
   i. T - section and [3]
   ii. Square section with diagonal vertical. [3]
   iii. Circular section. [3]

   (b) An I section is having overall depth as 550mm and overall width as 200mm. The thickness of the flanges is 25mm where as the thickness of the web is 20mm. If the section carries a shear force of 45kN, calculate the shear stress values at salient points and draw the sketch showing variation of shear stress. [7]

8. (a) State the assumptions involved in the theory of simple bending. [6]

   (b) A simply supported Symmetric I - section has flanges of size 200mm $\times$ 15mm and its overall depth is 520mm. Thickness of web is 10mm. It is strengthened with a plate of size 250mm $\times$ 12mm on compression side. Find the moment of resistance of the section if permissible stress is 160MPa. How much uniformly distributed load it can carry if it is used as a cantilever of span 3.6m. [10]

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Code No: R05210303 **R05** **Set No. 3**

**II B.Tech I Semester Examinations,November 2010**
**MECHANICS OF SOLIDS**
**Common to ME, MECT, MEP, AE, AME, MMT**

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

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

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1. Sketch the shear force and bending moment diagrams showing the salient values for the loaded beam shown in the figure1 below. [16]

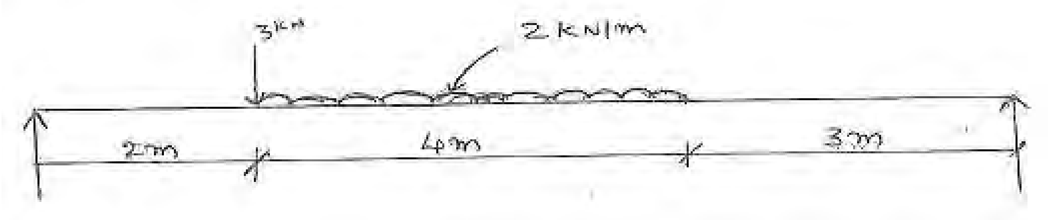


Figure 1

2. A compound cylinder is formed by shrinking one tube on to another, the final dimensions being internal dia. 160mm, external dia. 240mm and dia. at junction 200cm. If after shrinking on the radial pressure at the common surface is $10N/mm^2$, Calculate the initial stresses set up across the section if now fluid under a pressure of $80N/mm^2$, is admitted inside the compound tube, calculate the final stresses set up across the section. Sketch the variation of stresses across the thickness of compound tube at different stages. [16]

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   Find the deflection at the point of application of the couple and the maximum deflection and slope. [16 ]

4. Derive an expression for calculating the thickness of the thin cylindrical shell and solve the following problem. A thin cylindrical shell of 1.2 m diameter is subjected to an internal pressure of 1.2 N/mm$^2$. If the tensile strength of the plate is 415 N/mm$^2$ and factor of safety is 4, then calculate the suitable thickness of the shell. [16]

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   (b) Draw stress - strain diagram for mild steel. Indicate salient points and define them. [8]

6. (a) Sketch the variation of shear stress across the depth of the beam of the following cross sections.
      i. T - section and [3]
      ii. Square section with diagonal vertical. [3]

iii. Circular section. [3]

(b) An I section is having overall depth as 550mm and overall width as 200mm. The thickness of the flanges is 25mm where as the thickness of the web is 20mm. If the section carries a shear force of 45kN, calculate the shear stress values at salient points and draw the sketch showing variation of shear stress. [7]

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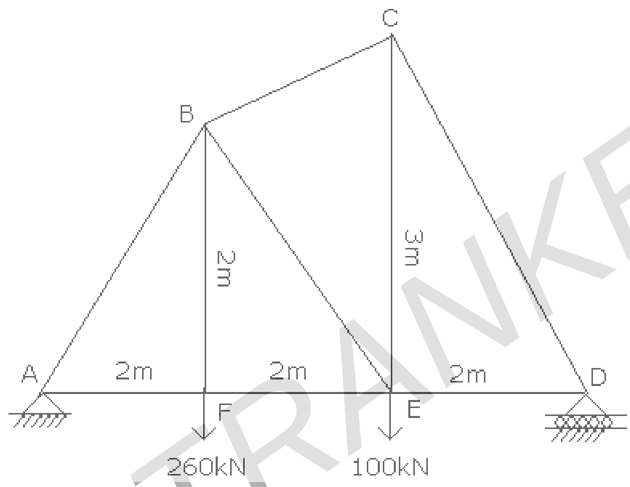


Figure 7

8. (a) State the assumptions involved in the theory of simple bending. [6]

(b) A simply supported Symmetric I - section has flanges of size 200mm × 15mm and its overall depth is 520mm. Thickness of web is 10mm. It is strengthened with a plate of size 250mm × 12mm on compression side. Find the moment of resistance of the section if permissible stress is 160MPa. How much uniformly distributed load it can carry if it is used as a cantilever of span 3.6m. [10]

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