Code No: R05210103 **R05** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
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) A steel cylinder 240mm internal diameter is to withstand an internal pressure of 5N/mm^2. The increase in area of the bore due to the resulting radial expansion is limited to 0.1% of the nominal area. Calculate the necessary thickness of the cylinder and the circumferential stress induced in the section. Take E = 2 X 10^5 N/mm^2, $\mu = 0.3$

   (b) A long boiler tube has to withstand an internal pressure of 6N/mm^2. The internal diameter of the tube is 60 mm. Determine the thickness and mass/m of the tube if the circumferential stress is not to exceed 130 N/mm^2. Mass density of steel is 7850 kg/m^3. [10+8]

2. Calculate the section modulus for the I – section shown in Figure 2 and hence calculate maximum bending stress if the B. M = 50 KNm. [16]

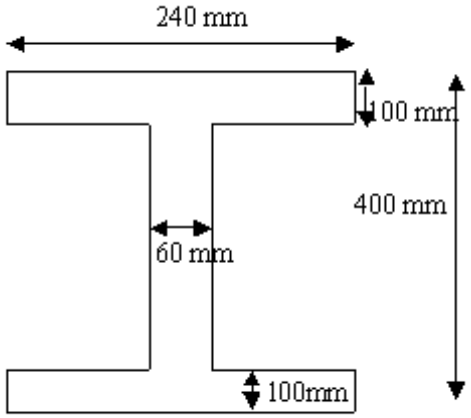

Figure 2

3. A thick cylinder having internal radius 200mm and external radius 300mm is subjected to $4N/mm^2$. Find the internal pressure that can be applied if the max. permissible stress is $15N/mm^2$. Find also the change in thickness of the cylinder. Take $E = 200GN/m^2$ and $\frac{1}{m} = 0.3$ [16]

4. A beam ABCD, 10 m long carries loads as shown in (figure 4) below If E=200 x 10^6 KN/m^2 and I=80 x 10^{-6} m^4 determine the central deflection. [16]

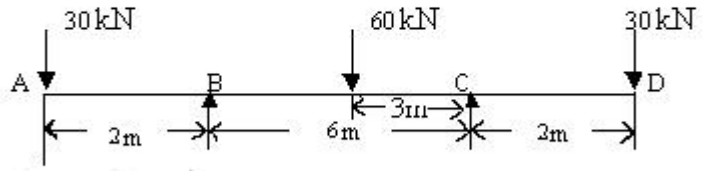

Figure 4

5. (a) Two bars of different materials , but same length , are of dia. d_1 and d_2. If their respective elastic moduli are E_1 and E_2 , show that the ratio of strain energies due to the same axial load = $(d_2 / d_1)^2$. (E_2 / E_1).

   (b) Find the ratio of strain energies of two bars of the same dia., same length when subjected to the same axial load, if one is of aluminum having E = 70 Gpa and the second bar is of steel having E = 200 Gpa. [8+8]

6. Construct the S. F. D & B. M. D for the beam with over hangs as shown in Figure 6. [16]

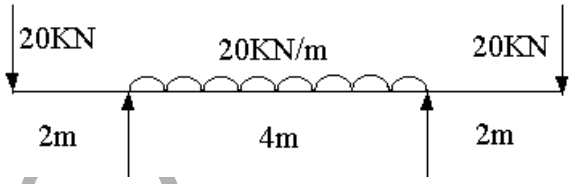

Figure 6

7. A beam supports a maximum bending moment of 60 KNm at a section on span. The cross section dimensions are b = 230 mm, d = 400 mm. Calculate the maximum bending stresses. [16]

8. State Hooke's law. Sketch the stress- strain diagram for a ductile material like mild steel tested under tension upto destruction, marking the salient points on it. Explain the significance of each point. [16]

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Code No: R05210103 **R05** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
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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2. State Hooke's law. Sketch the stress- strain diagram for a ductile material like mild steel tested under tension upto destruction, marking the salient points on it. Explain the significance of each point. [16]

3. A beam ABCD, 10 m long carries loads as shown in (figure 3) below If E=200 x 10^6 KN/m^2 and I=80 x 10^{-6} m^4 determine the central deflection. [16]

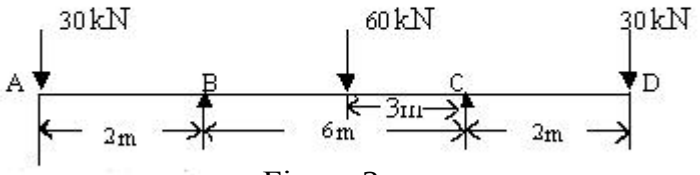

Figure 3

4. Calculate the section modulus for the I – section shown in Figure 4 and hence calculate maximum bending stress if the B. M = 50 KNm. [16]

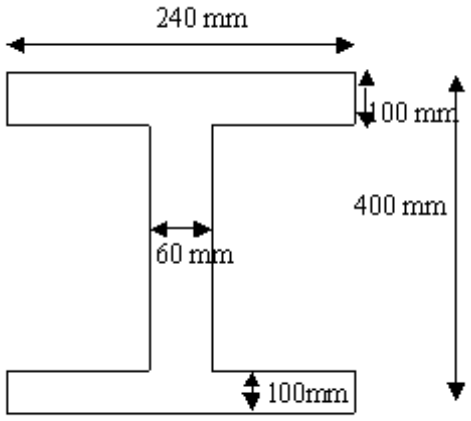

Figure 4

5. (a) Two bars of different materials , but same length , are of dia. d_1 and d_2. If their respective elastic moduli are E_1 and E_2 , show that the ratio of strain energies due to the same axial load = (d_2 / d_1)^2. (E_2 / E_1).

(b) Find the ratio of strain energies of two bars of the same dia., same length when subjected to the same axial load, if one is of aluminum having E = 70 Gpa and the second bar is of steel having E = 200 Gpa. [8+8]

6. A beam supports a maximum bending moment of 60 KNm at a section on span. The cross section dimensions are b = 230 mm, d = 400 mm. Calculate the maximum bending stresses. [16]

7. Construct the S. F. D & B. M. D for the beam with over hangs as shown in Figure 7. [16]

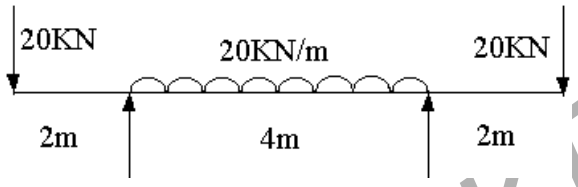

Figure 7

8. (a) A steel cylinder 240mm internal diameter is to withstand an internal pressure of 5N/mm^2. The increase in area of the bore due to the resulting radial expansion is limited to 0.1% of the nominal area. Calculate the necessary thickness of the cylinder and the circumferential stress induced in the section. Take E = 2 X 10^5 N/mm^2, $\mu = 0.3$

(b) A long boiler tube has to withstand an internal pressure of 6N/mm^2. The internal diameter of the tube is 60 mm. Determine the thickness and mass/m of the tube if the circumferential stress is not to exceed 130 N/mm^2. Mass density of steel is 7850 kg/m^3. [10+8]

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Code No: R05210103 **R05** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
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 ABCD, 10 m long carries loads as shown in (figure 1) below If E=200 x 10^6 KN/m^2 and I=80 x 10^{-6} m^4 determine the central deflection. [16]

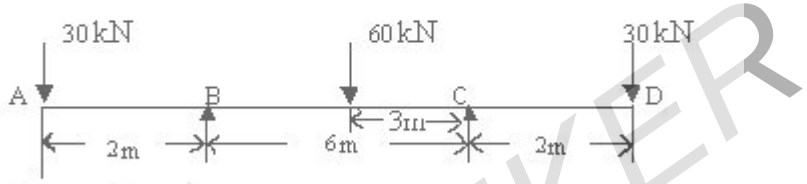

Figure 1

2. (a) Two bars of different materials , but same length , are of dia. d_1 and d_2. If their respective elastic moduli are E_1 and E_2 , show that the ratio of strain energies due to the same axial load = (d_2 / d_1)^2. (E_2 / E_1).

   (b) Find the ratio of strain energies of two bars of the same dia., same length when subjected to the same axial load, if one is of aluminum having E = 70 Gpa and the second bar is of steel having E = 200 Gpa. [8+8]

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   (b) A long boiler tube has to withstand an internal pressure of 6N/mm^2. The internal diameter of the tube is 60 mm. Determine the thickness and mass/m of the tube if the circumferential stress is not to exceed 130 N/mm^2. Mass density of steel is 7850 kg/m^3. [10+8]

4. State Hooke's law. Sketch the stress- strain diagram for a ductile material like mild steel tested under tension upto destruction, marking the salient points on it. Explain the significance of each point. [16]

5. Calculate the section modulus for the I – section shown in Figure 5 and hence calculate maximum bending stress if the B. M = 50 KNm. [16]

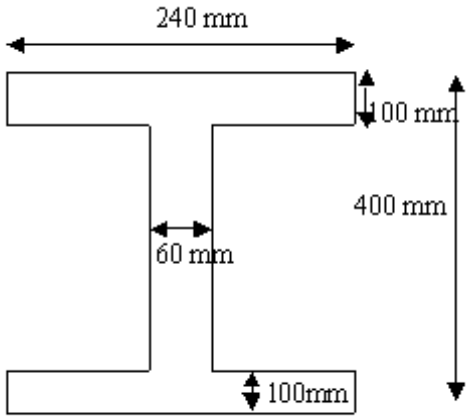

Figure 5

6. A beam supports a maximum bending moment of 60 KNm at a section on span. The cross section dimensions are b = 230 mm, d = 400 mm. Calculate the maximum bending stresses. [16]

7. Construct the S. F. D & B. M. D for the beam with over hangs as shown in Figure 7. [16]

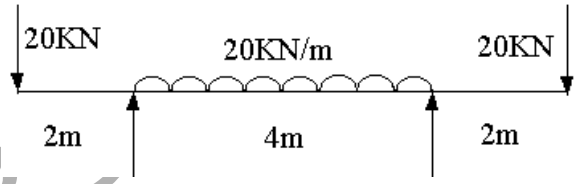

Figure 7

8. A thick cylinder having internal radius 200mm and external radius 300mm is subjected to $4N/mm^2$. Find the internal pressure that can be applied if the max. permissible stress is $15N/mm^2$. Find also the change in thickness of the cylinder. Take $E = 200GN/m^2$ and $\frac{1}{m} = 0.3$ [16]

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Code No: R05210103 **R05** **Set No. 3**

II B.Tech I Semester Examinations,November 2010
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) A steel cylinder 240mm internal diameter is to withstand an internal pressure of 5N/mm^2. The increase in area of the bore due to the resulting radial expansion is limited to 0.1% of the nominal area. Calculate the necessary thickness of the cylinder and the circumferential stress induced in the section. Take E = 2 X 10^5 N/mm^2, μ = 0.3
   (b) A long boiler tube has to withstand an internal pressure of 6N/mm^2. The internal diameter of the tube is 60 mm. Determine the thickness and mass/m of the tube if the circumferential stress is not to exceed 130 N/mm^2. Mass density of steel is 7850 kg/m^3. [10+8]

2. Construct the S. F. D & B. M. D for the beam with over hangs as shown in Figure 2 [16]

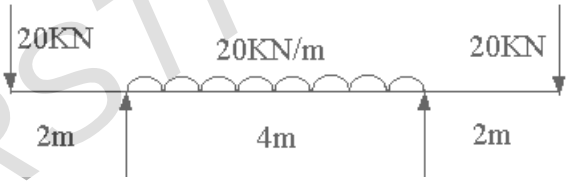

Figure 2

3. (a) Two bars of different materials , but same length , are of dia. d_1 and d_2. If their respective elastic moduli are E_1 and E_2 , show that the ratio of strain energies due to the same axial load = (d_2 / d_1)^2. (E_2 / E_1).
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6. Calculate the section modulus for the I – section shown in Figure 6 and hence calculate maximum bending stress if the B. M = 50 KNm. [16]

Code No: R05210103 **R05** **Set No. 3**

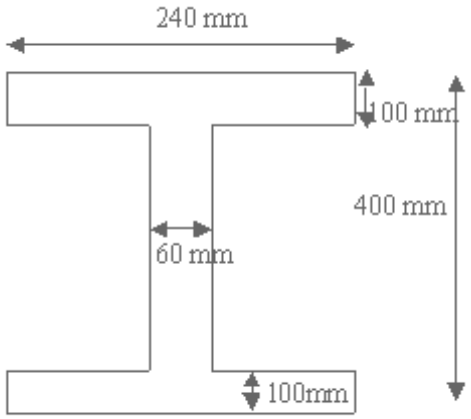
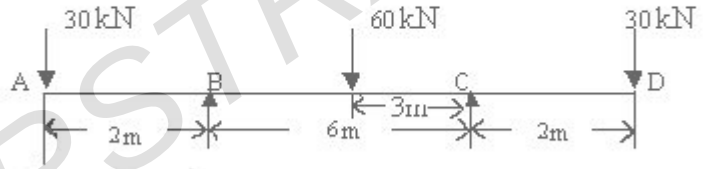


Figure 6

7. A beam ABCD, 10 m long carries loads as shown in (figure7). below If E=200 x 10^6 KN/m^2 and I=80 x 10^{-6} m^4 determine the central deflection. [16]



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