1. A steel beam whose cross section is shown in figure 1 carries a uniform load per unit length (including the weight of the beam) of 40 kN/m.

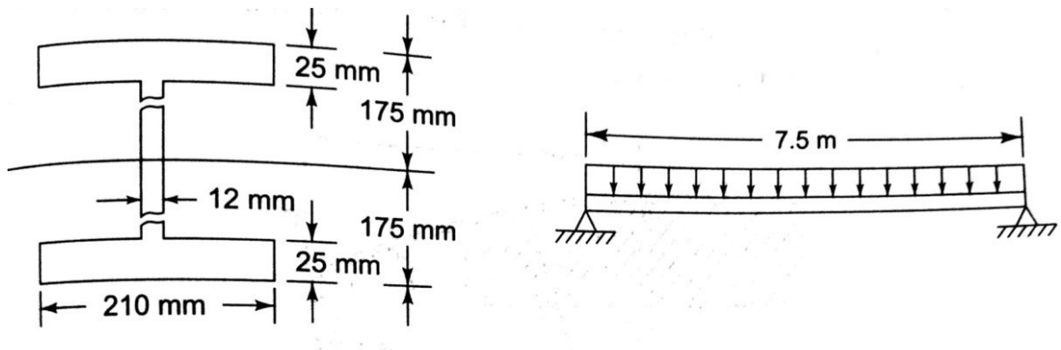

Figure 1

Calculate the moment of inertia (I_{zz}) of the I beam

- **I_{zz} = 3.048 x 10^8 mm^4**
- I_{zz} = 4.048 x 10^8 mm^4
- I_{zz} = 5.048 x 10^8 mm^4
- I_{zz} = 6.048 x 10^8 mm^4

2. Calculate the maximum bending stress in the beam.

- 161.5 MPa

3. A steel beam 25 mm wide and 75 mm deep is pinned to supports at points A and B as shown in figure 4. Where the ends of the beams are loaded with 5 kN loads

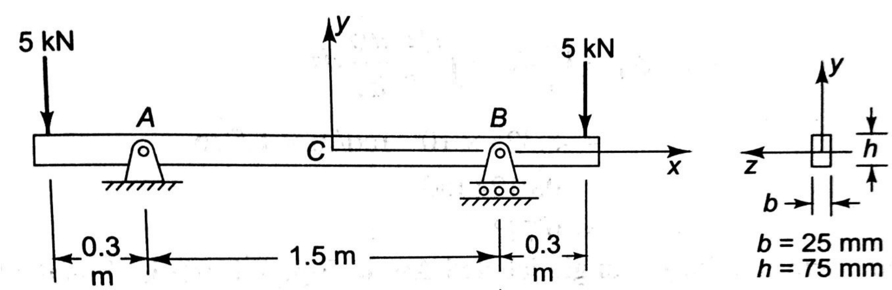

Figure 2

Find the maximum bending stress at the mid span of the beam.

- 34 MPa
- 44 MPa
- 54 MPa
- **64 MPa**

4. What is the value (magnitude) of the radius of curvature of section AB.

- 100 m
- 110 m
- **120 m**
- 130 m

5. Calculate the moment of inertia for the figure shown below.

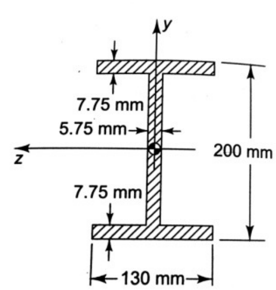

Figure 3

- $\mathbf{I_{zz} = 2.164 \times 10^7\ mm^4}$
- $I_{zz} = 3.164 \times 10^7\ mm^4$
- $I_{zz} = 4.164 \times 10^7\ mm^4$
- $I_{zz} = 5.164 \times 10^7\ mm^4$

6. A new theory of Egyptian pyramid building proposes that the large pyramid blocks were lifted onto sledges by the counterweighted wooden lever system shown in the figure. The sledges were then pulled up the sides of the pyramid by manpower. If the wood in the levers has an ultimate tensile stress of 52 MPa and ultimate shear stress of 10 MPa, find on the basis of these ultimate stresses the dimensions of the smallest square piece of timber which will support the pyramid blocks as shown

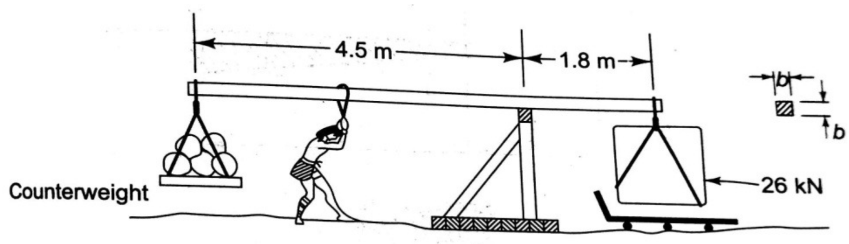

Figure 4

bt = 0.1754 m

7. A section of steel beam of rectangular cross section 50 x 25 mm is loaded by a moment of 1.7 kNm about an axis parallel to the smallest side. Find out the maximum bending stress in the beam.

- 163.2 MPa

8. It is proposed to use flat steel belts for a belt drive in which very precise control of the motion is required. The pulley diameter is 300 mm. What is the thickest belt which can be wrapped 180˚ around the pulley without exceeding a stress of 280 MPa.

- t = 4.206 x 10^{-4} m

9. In the above question what would be the maximum thickness if the belts were halved?

- σ = 140 MPa