

QUESTION 3

b) STEEL

$$I = \frac{0.03 \times (0.03)^3}{12}$$

$$= 6.75 \times 10^{-8}$$

$$Flexural = E \times I$$

$$= 200 \times 10^9 \times 6.75 \times 10^{-8}$$

$$= 13500 \text{ N}^4$$

Aluminium

$$I = \frac{0.03 \times (0.003)^3}{12}$$

$$= 6.75 \times 10^{-8}$$

$$= E \times I$$

$$= 69 \times 10^9 \times 6.75 \times 10^{-8}$$

$$= 4657.5 \text{ N}^4$$

ALUMINIUM HAS A HIGHER FLEXURAL RIGIDITY

c) STEEL $\rho = 7900 \text{ kgm}^3$
 ALUMIN $\rho = 2700 \text{ kgm}^3$

$$\text{STIFFNESS TO WEIGHT RATIO STEEL} = \frac{E}{\rho}$$

$$= \frac{200 \times 10^9}{7900}$$

$$= 25316455.7$$

$$= 25.3 \times 10^6 \text{ Pa m}^3/\text{kg}$$

$$\text{OF ALUMIN} = \frac{E}{\rho}$$

$$= \frac{69 \times 10^9}{2700}$$

$$= 25.6 \times 10^6 \text{ Pa m}^3/\text{kg}$$