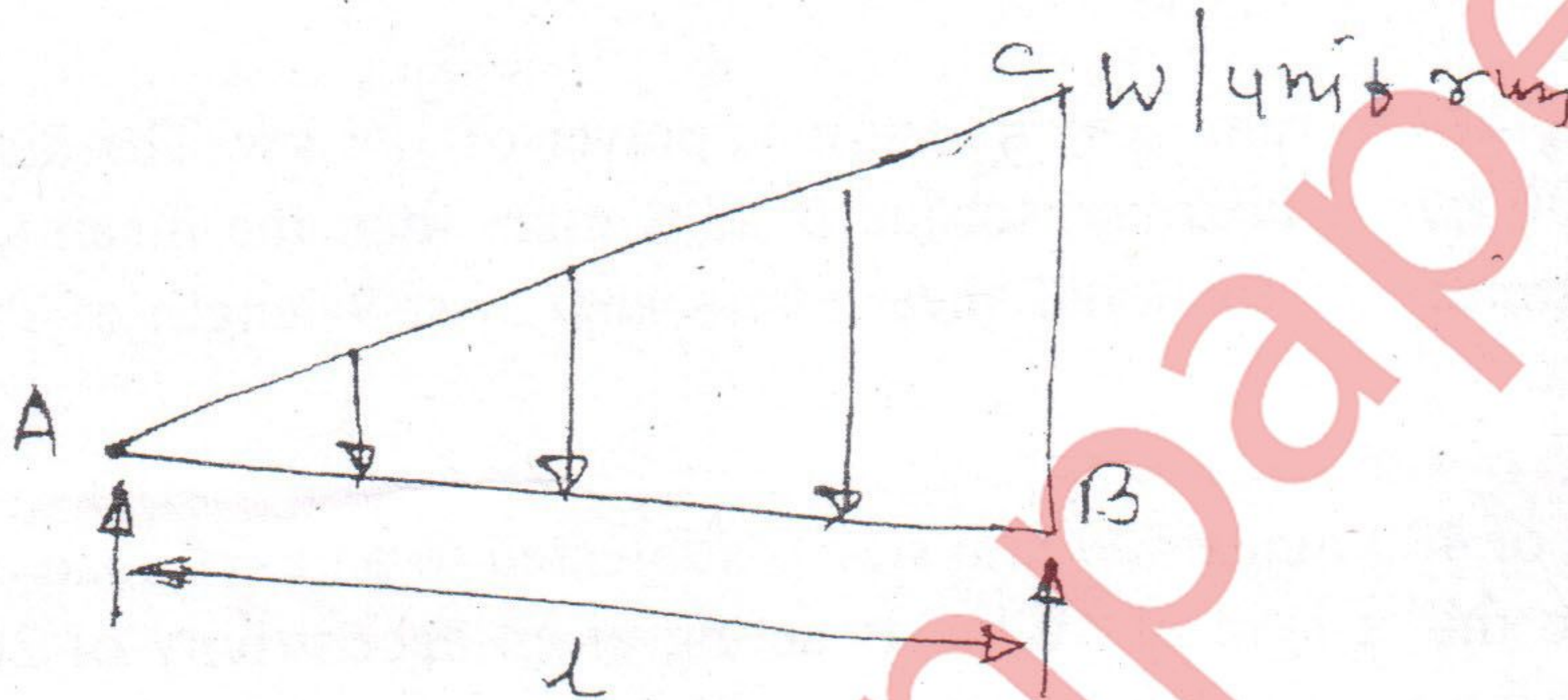
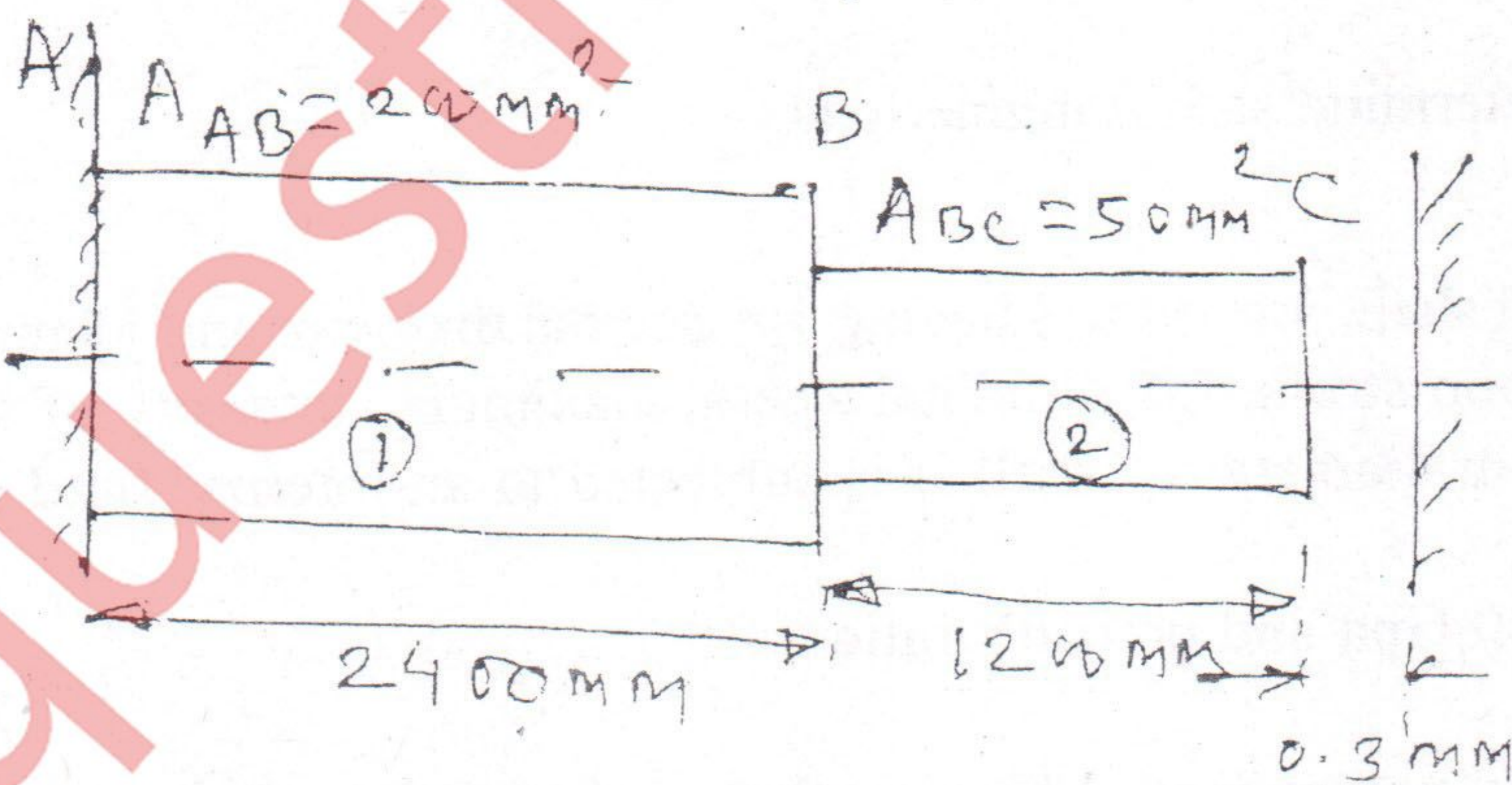


N.B. : (1) Question No. 1 is compulsory.
(2) Attempt any three questions from remaining.

- 1. (a) Derive relation among bending moment, shear force and rate of loading. 5
- (b) What is modulus of Elasticity, Bulk modulus and modulus of Rigidity. State Relation between them. 5
- (c) State assumptions made in theory of simple Bending. 5
- (d) Find maximum shear stress induced in a solid circular shaft of diameter 150mm. 180 rpm. 5
- 2. (a) Sketch SFD and BMD for a beam shown in fig. 10



- (b) Determine the support reaction at A and C when AB is loaded axially by 7...at B 10 as shown in fig. Take $E = 200 \times 10^3$ Mpa.

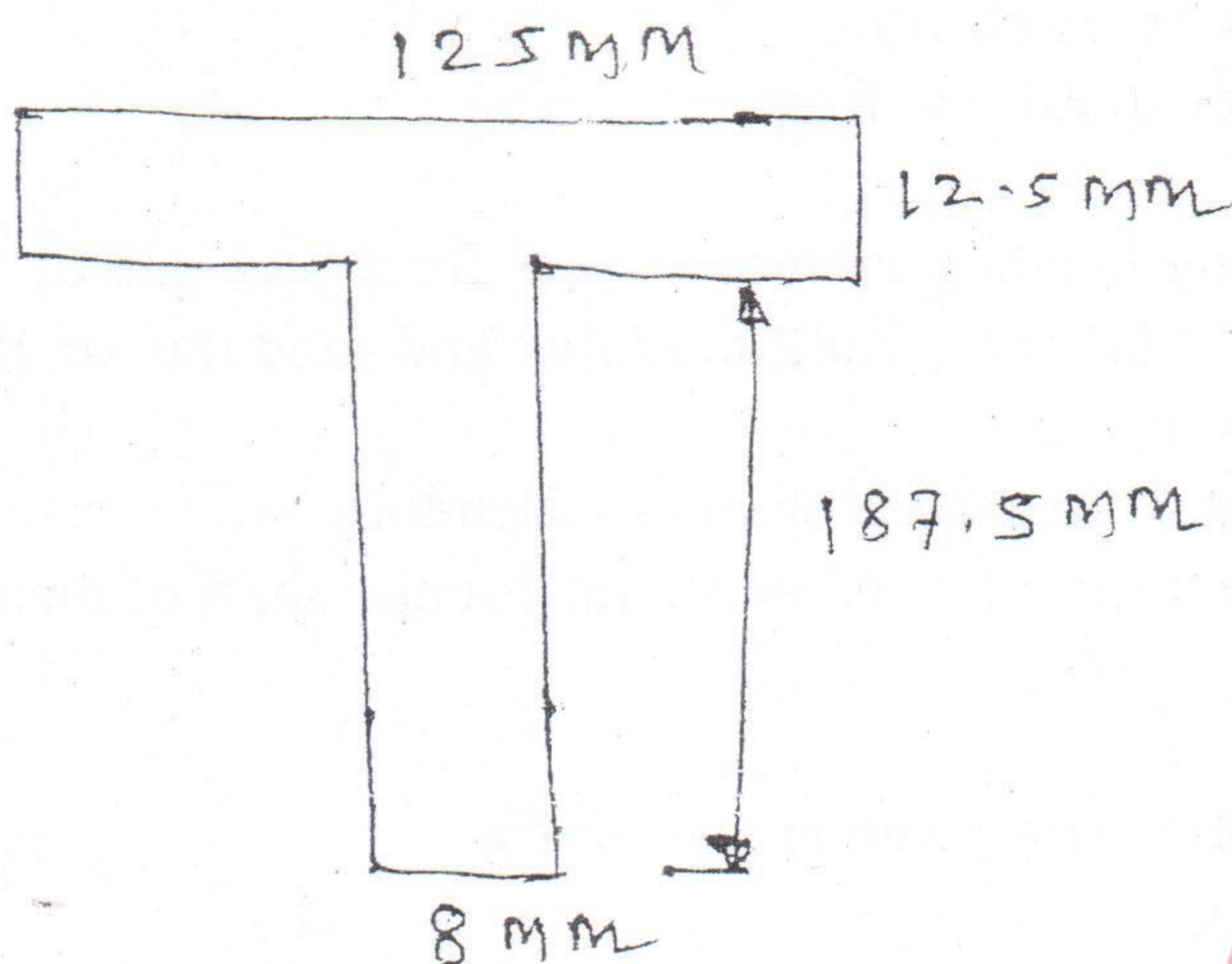


- 3. (a) Two wooden planks 150 mm x 50 mm each are connect to form at section of a beam if a moment of 3.4 kn.m is applied around a horizontal neutral axis, inducing tension below the neutral axis, Find stresses at the extreme fibres of the cross section. Also calculate total tensile force on cross section. 10
- (b) A bar 1.4 cm in diameter gets stretched by 0.25 cm under a steady load of 8 kn. 10 What stress would be produced in same bar by a weight of 0.8 kn. Which falls freely vertically through a distance of 7cm to a rigid collar attached at its end. Take $E = 200$ Gn/m².

2.

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4. (a) A T beam of span 5m has a flange 12.5 mm x 125 mm and web 187.5 mm x 8 mm. 10
If max^m. permissible stress is 150 mpa. Find maximum u.d.l the beam can carry.



- (b) A shaft is rotating at 150 rpm. And transmits a power of 500 kw. The diameter of the shaft is 100 mm. Maximum torque is 25% more than the mean torque. What is the Magnitude of torsional shear stress and twist 9 length of shaft is 1.5m. $G = 85 \text{ Gpa}$. 10
5. (a) A square column of 400 mm x 400 mm size is subjected to an axial load of 400 kn. In addition to this a load of 40 kn. is acting at an eccentricity of 20 mm about both x-x and y-y axes. Find stresses at all four corners. 10
- (b) A follow cast iron column of 200 mm external diameter 100 mm internal diameter and 8m Long has both end fixed. If is subjected to axial compressive load. Taking factor of safety as 5. $\sigma_c = 540 \text{ N/mm}^2$. 10
- $\alpha = \frac{1}{1600}$ determine safe Rankine load.
6. (a) A cylindrical shell, 3m long, is having 1m internal diameter and 15mm thickness. Calculate hoop stress, Longitudinal stress, maximum intensity of shear stress and change in diameter of shell if is subjected to an internal fluid pressure of 1.5 Mpa. 10
Take $E = 200 \text{ Gpa}$ and poisson's ration = 0.3.
- (b) Two mutually perpendicular planes of on clement of material are subjected to tensile stress of 100 N/mm^2 . compressive stress 40 N/mm^2 . and shear stress 60 N/mm^2 . and shear stress 60 N/mm^2 . Find. 10
- Magnitude and direction of principal stressed.
 - Magnitude of normal and shear stress on a plane, on which shear stress is maximum.