

Civil/III CBSEGS/SOM

28.5.14

QP Code : NP-18666

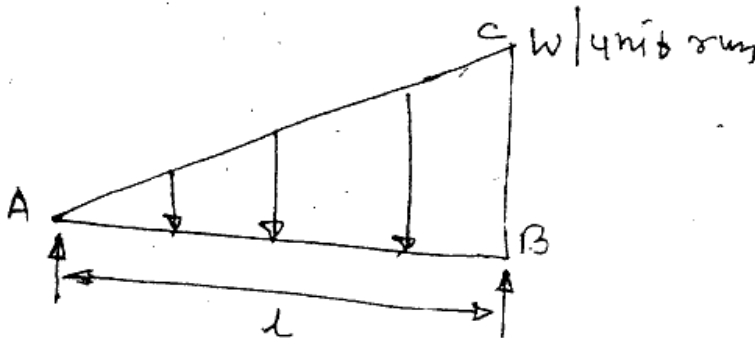
(3 Hours)

[ Total Marks : 100

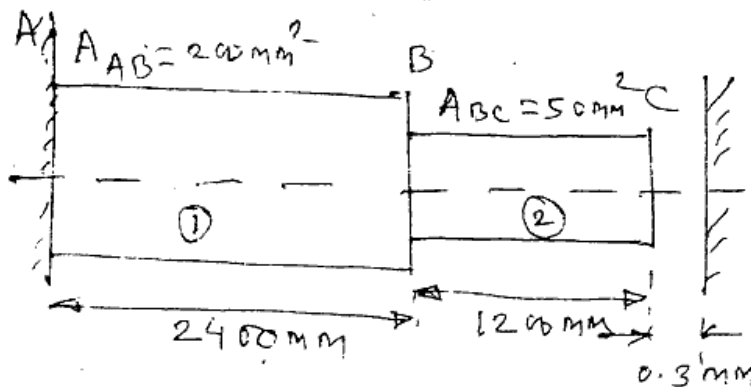
N.B. : (1) Question No. 1 is compulsory.

(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  $E = 200 \times 10^3 \text{ Mpa}$ .



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  $E = 200 \text{ Gn/m}^2$ .

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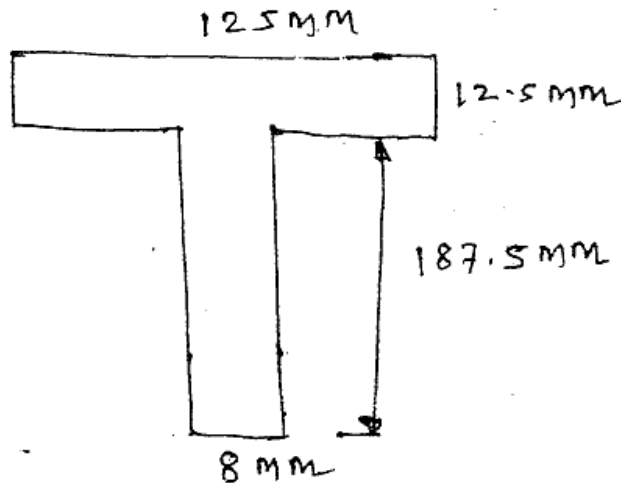
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Civil III C B S G S / SOM 28.5.14

2.

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4. (a) A T beam of span 5m has a flange 125 mm x 125 mm and web 187.5 mm x 8 mm. 10  
If max<sup>m</sup>. 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 300 kw. The diameter 10  
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.  $G = 85 \text{ Gpa}$ .
5. (a) A square column of 400 mm x 400 mm size is subjected to an axial load of 400 10  
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.
- (b) A follow cast iron column of 200 mm external diameter 100 mm internal diameter 10  
and 8m Long has both end fixed. If is subjected to axial compressive load. Taking  
factor of safety as 5.  $\sigma_c = 540 \text{ N/mm}^2$ .
- $\alpha = \frac{1}{1600}$  determine safe Rankine load.
6. (a) A cylindrical shell, 3m long, is having 1m internal diameter and 15mm thickness. 10  
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.  
Take  $E = 200 \text{ Gpa}$  and poisson's ration = 0.3.
- (b) Two mutually perpendicular planes of on element of material are subjected to 10  
tensile stress of  $100 \text{ N/mm}^2$ . compressive stress  $40 \text{ N/mm}^2$ . and shear stress  $60 \text{ N/mm}^2$ . and shear stress  $60 \text{ N/mm}^2$ . Find.
- Magnitude and direction of principal stressed.
  - Magnitude of normal and shear stress on a plane, on which shear stress is maximum.