B.Arch. Third Semester (Architectural Engineering) (CGS) -

10023 : Architectural Structure - II : 03 AR 05

P. Pages : 2 | AU - 2543

Time : Three Hours | Max. Marks : 80

Notes :
1. All question carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.
5. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) A vertical bar 4m long and of 2000 mm^2 cross sectional area is fixed at upper end and has a collar at the lower end. Determine the maximum stress induced when a weight of 3000 N falls through a height of 25 cm on the collar and 30000 N falls through a height of 2.5 cm on the collar. ($E = 2x10^5$ MPa). **10**

b) Prove that the stress occurred due to suddenly applied load is twice that of stress occurred due to gradually applied load. **6**

OR

2. a) A bar of 12mm diameter gets stretched by 3mm under a steady load of 800 kg. What stress would be produced in the bar by a weight of 80 kg which falls through 8 cm before starting the stretching of the bar. $E = 2x10^3$ tonnes/cm^2. **10**

b) Define: **6**
- i) Resilience.
- ii) Proof Resilience
- iii) Modulus of Resilience.

3. a) A timber beam is required to span 4m carrying total uniform load of 40kN. The safe allowable bending stress is 8N/mm^2. Choose a suitable depth for the beam section if width is to be 120mm. **12**

b) State the assumptions made in the theory of simple bending. **4**

OR

4. A T-Shaped cross-section of beam as Shown in fig. 4 is subjected to a vertical shear force of 100kN. Calculate the shear stress at important points and draw shear stress distribution diagram. **16**

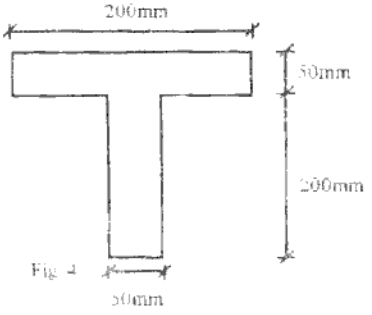

Fig. 4

M.I. @ the horizontal neutral axis is $113.4x10^6$ mm^4.

5. Fig. 5 shows a built up. Column consisting of 150mm x 100mm R.S.J. with 120mm x 12mm plate rivetted to each flange. Calculate the safe load, the column can carry if its is 4m long having one. **16**

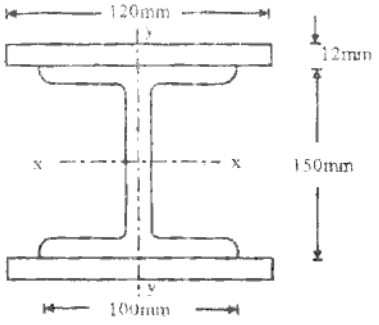

Fig. 5

end fixed and the other hinged with a factor of safety 3.5 Take the properties of joist as $A = 2167\ mm^2$, $Ixx = 8.391x10^6 mm^4$, $Iyy = 0.948x10^6\ mm^4$. Assume the yield stress as 315 MPa and Rankine's constant a = 1/7500.

OR

6. A T section 150mm x 120mm x 20mm is used as a strut of 4m long with both ends fixed. Calculate the crippling load, if young's Modulus for column material be 200 GPa. **16**

7. a) Explain: **8**
   i) Liquid limit ii) Plastic limit

   b) Define: **8**
   i) Void Ratio ii) Porosity
   iii) Degree of Saturation iv) Bulk density.

OR

8. a) Differentiate between compaction and consolidation. **8**

   b) Explain soil properties and characteristics relevant to design of foundation. **8**

9. A masonry pier of 3500mm x 4200mm supports a vertical load of 120kN as shown in figure 9. Find the stresses developed at each corner of the pier. **16**

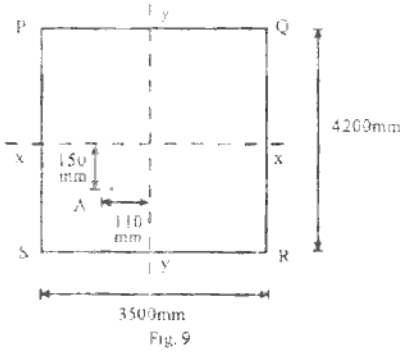

Fig. 9

OR

10. Determine the maximum and minimum stresses at the base of hollow circular chimney of height 22m with external diameter 5m and internal diameter 3m. The chimney is subjected to a horizontal. wind pressure of intensity 1.2 kN/m^2. The specific weight of the material of chimney is 25 kN/m^2. **16**

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