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

10023 : Architectural Structure – II 03 AR 05

P. Pages : 2 **AV - 2659**

Time : Three Hours Max. Marks : 80

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Notes :
1. All question carry equal marks.
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 $2000mm^2$ cross sectional area is fixed at upper end & has a collar at the lower end. Determine the maximum stress induced when a weight of 3000N falls through a height of 25cm on the collar and 30000N falls through a height of 2.5cm on the collar Take E = 200 Gpa. **10**

b) A Mild steel plate is 400mm Long, 200mm wide & 50mm thick is subjected to gradually applied load of 1200kN. Calculate **6**
i) Proof Resilience ii) Modulus of Resilience iii) Elongation
Take $E = 2 \times 10^5 N / mm^2$.

OR

2. a) Prove that stress occurred due to suddenly Applied Load is twice that of stress occurred due to gradually Applied load. **6**

b) Determine Instantaneous stress and deformation of a rod of 1m Length & 6mm diameter if the mass of 50 kg falls through a height of 10cm & strikes the bottom of the rod. Assume E = 210 GPa. **10**

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 theory of simple bending. **4**

OR

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

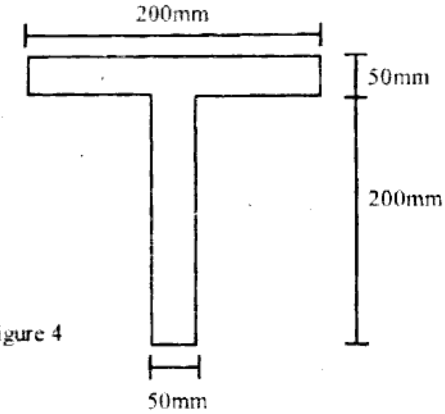

Figure 4

M.I. @ the horizontal Neutral axis is $113.4 \times 10^6 mm^4$.

5. A hallow CI column whose outside diameter is 200mm has a thickness of 20mm. It is 4.5m Long & is fixed at both ends. Calculate safe Load by Rankine's formula using FOS of 4. Calculate the slenderness ratio and the ratio of Euler's and Rankine's critical Load. Take $\sigma_c = 550N/mm^2$ $\alpha = 1/1000$ in Rankine's formula and $E = 9.4\times10^4 N/mm^2$. **16**

OR

6. Determine the Crippling load for a T-Section of diamensions 10cm x 10cm x 2cm and of length 5m when it is used as a strut with both of its ends hinged. **16**
Take $E = 2\times10^5 N/mm^2$.

7. a) Explain. **8**
   a) Liquid Limit.
   b) Plastic Limit.

   b) Define. **8**
   a) Void Ratio.
   b) Porosity.
   c) Degree of saturation.
   d) Bulk density.

OR

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

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

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

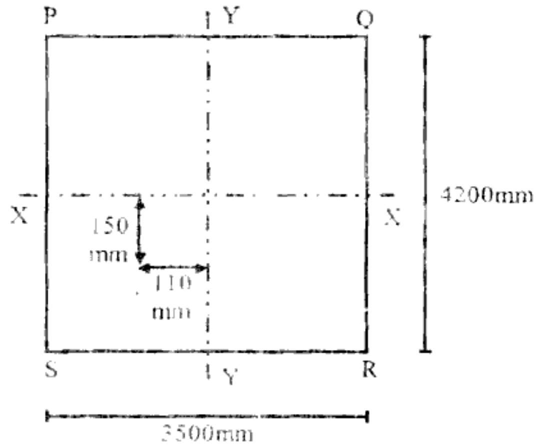

Figure 9

OR

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

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