

Roll No.

Total No. of Pages : 02

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M.Tech. (Structural Design) (Sem.-1)

DESIGN OF HIGH RISE STRUCTURES

Subject Code : MTSD-104

M.Code : 74245

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
 2. **Each question carries TWENTY marks.**
 3. **Missing data if any can be suitably assumed, clearly stating the same.**
 4. **Wherever possible support the answer with suitable sketches.**
 5. **Use of relevant codes is allowed (IS 1893, IS 875 Part III, IS 13920, IS 4326 etc.)**
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1. a) On the basis of your personal experience, describe briefly an engineering project that was significantly influenced by the nature of the soil encountered at the site of the project. (10)
b) Explain the member Force Analysis by Portal Method. (10)
 2. A building frame has 4 equal bays of 6m and three storeys each having height 3.2 m. The columns of first storey are fixed at their bases. For each girder, the dead load is 30 kN/m live load 25 kN/m. Using approximate method of analysis, determine :
a) The maximum girder shear.
b) The maximum +ve girder moment.
c) The maximum exterior column compression.
d) The maximum -ve girder moment (20)
 3. a) What are shear wall buildings? Discuss shear wall-frame interaction. How is load shared by two? (10)
b) A tube 2 mm thick has the shape shown in Fig. below. Find the shearing stress caused by a torque of 600 N-m. (10)

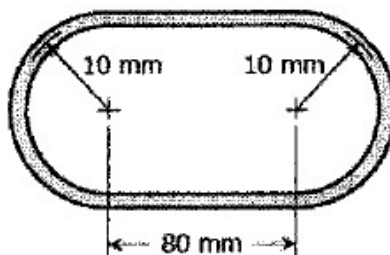


Fig.1

4. Design a shear wall of length 5.0 m and thickness 250 mm subjected to the forces given below and the wall is a high wall with the following loadings. Use M25 and Fe415. (20)

S.No	Loading	Axial Load (KN)	Shear Force (KN)	Bending Moment (KN- m)
1	DL+ LL	1950	500	20
2	Seismic Load	200	4500	800

5. A Vierendeel frame spanning over 12 m is made up of six bays of 2 m \times 2 m. All the members of the Vierendeel frame have the same length of 2m. The frame supports concentrated loads of 10kN each at the top boom junction node points. The analysis indicates the magnitude of maximum forces, moments and shear forces developed in the members of the frame as shown in table. Adopting M20 grade concrete and Fe 415 HYSD reinforcements, design suitable size and reinforcements in the various members. (20)

Design force components in Vierendeel frame				
Maximum design working force components				
Member Type	Axial compression (kN)	Axial Tension (kN)	Bending Moment (kNm)	Shear force (kN)
Top boom	12.5	-	12.5	12.5
Bottom boom	-	12.5	12.5	12.5
Verticals	10.0	-	20.0	20.0

6. a) Specify the difference between the structural members of a Vierendeel girder and truss. (2)
- b) What are the economical span ranges of reinforced concrete Vierendeel girders? (2)
- c) Briefly explain the Naylor's moment distribution method used for analysing the forces in Vierendeel girders. (6)
- d) Explain the types of force components developed in the various members of Vierendeel girders subjected to loads at the node points. (6)
- e) Explain with typical sketches the reinforcements used in the various structural members of Vierendeel trusses. (4)
7. a) Discuss elastic and inelastic stability of shear walls. (10)
- b) Discuss principle of three dimensional analysis of tall building. (10)
8. a) Discuss perforated core and their behavior in bending. (15)
- b) How tall buildings are structurally different from low rise buildings? (5)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.