BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
Second Semester (2022-23)

COMPREHENSIVE EXAMINATION
PART-B (OPEN BOOK)

Course No. CE G618 **Date: 06/05/2023**

Course Title: Design of Multi-storied Structures **Max Marks: 60**

Duration: 135 minutes

Q1. Figure 1 gives the line plans and front elevation of a framed building with wind loads acting at floor levels calculated on the basis of 28 N/m^2. Stiffness of the members is given as following. **[18]**

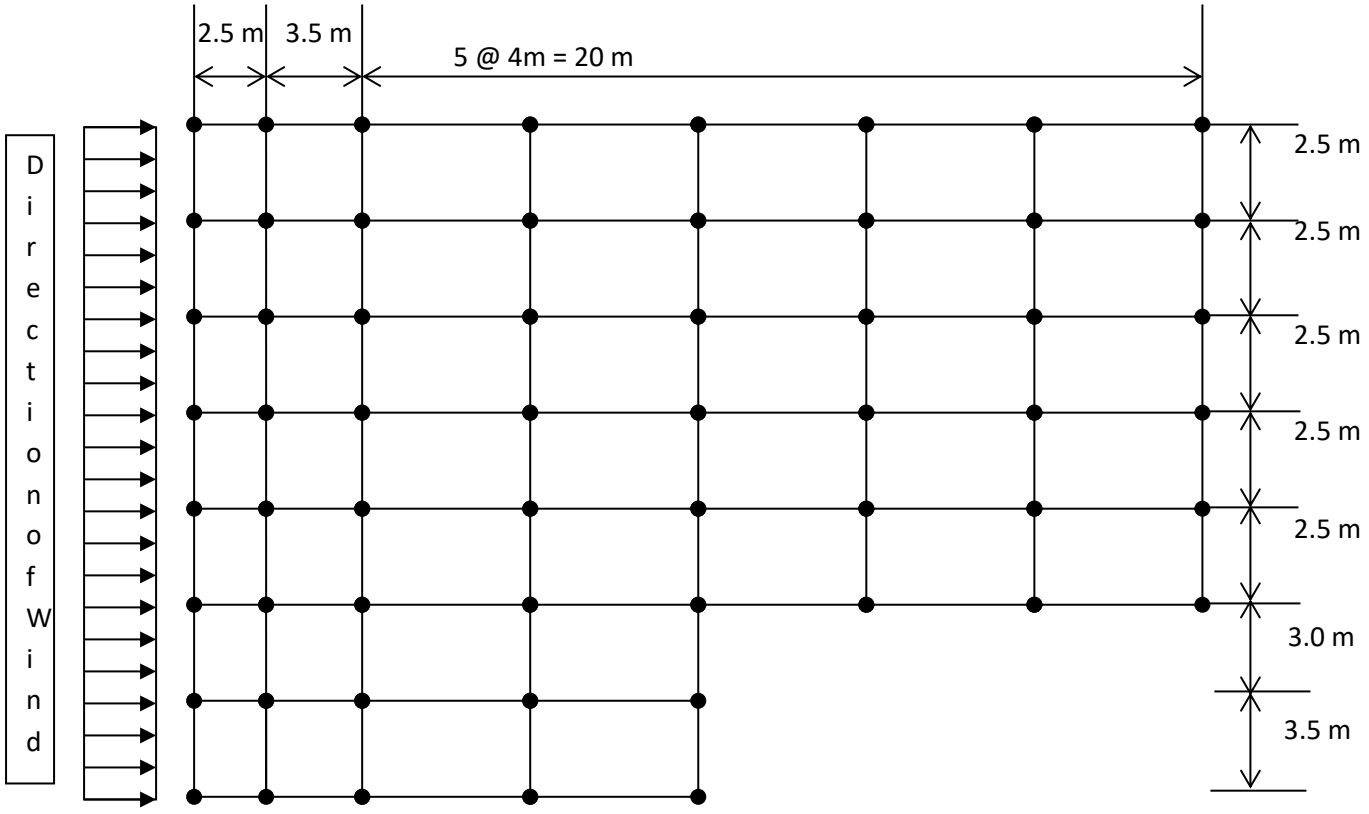
K for exterior beams = 1.0

K for interior beams = 1.5

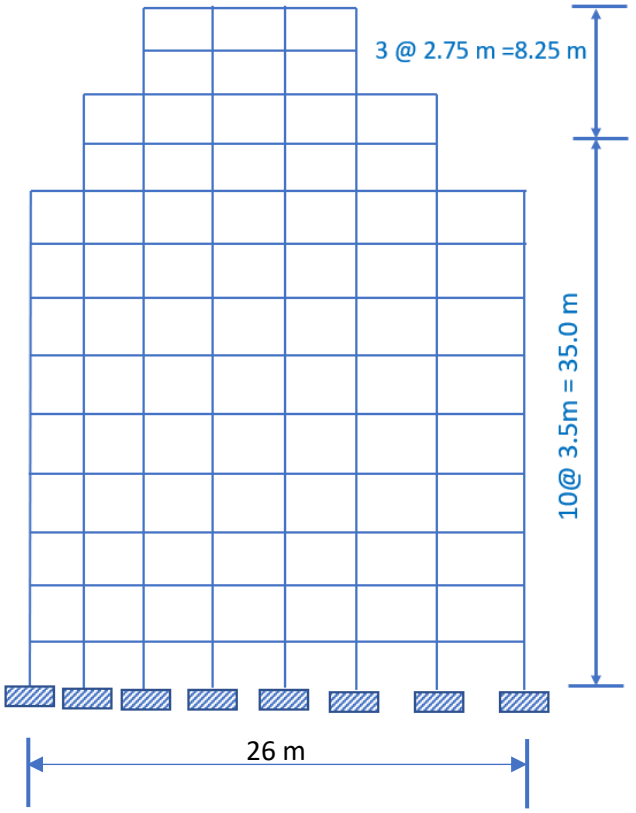
K for exterior columns = 4.5

K for interior columns = 9.0

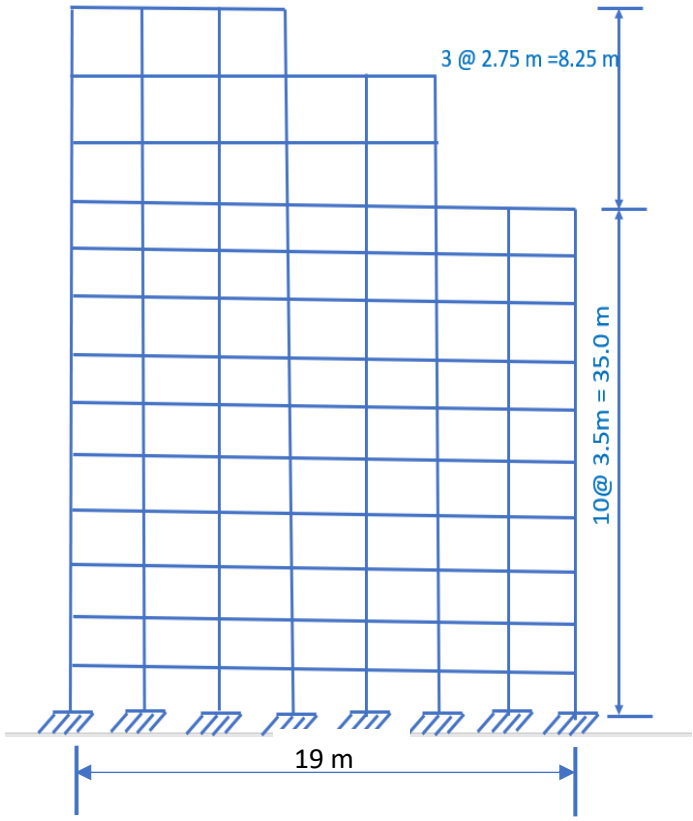
It is required to find the allocation of total horizontal shear at level 22.5 m from top to various bents.



Plan of the building at 22.5 m level



Front elevation of the building



Side elevation of the building

Q.2 Fig.Q2 gives floor plan of a shear walled multistoried structure consisting of three shear walls (A, B, & C) made of different materials with Modulus of Elasticity values as 2.5 kN/m^2, 2.0 kN/m^2 and 3.0 kN/m^2 respectively. The horizontal shear in the storey under consideration is denoted by P_y acting on its long side along the center line of the building. The storey height is taken as 3 m. It is required to compute the shear center of the structure. Wall thickness is 230 mm everywhere. **[18]**

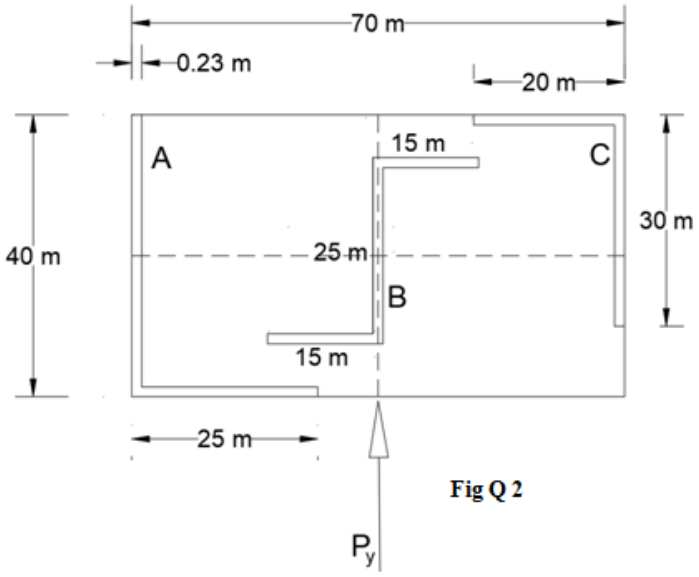
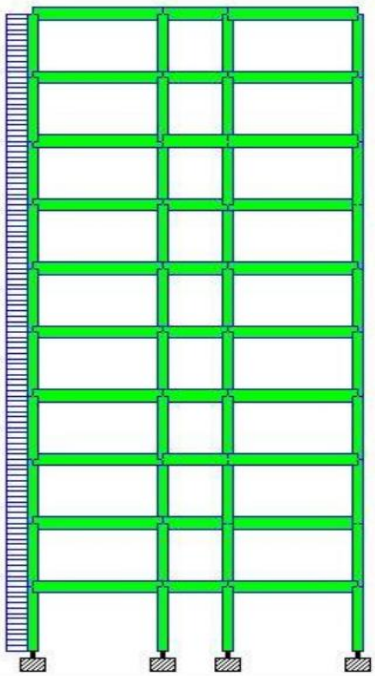


Fig Q 2

Q.3 Compute the drift at the top of a multistoried frame shown in Figure with following data. **[4]**

- Height of the building = 30m
- Inter story height of the building = 3m
- Dimension of the beam = 400 x 600 mm
- Dimension of the column = 400 x 400 mm
- Lateral load = 5 kN/m^2
- M60 grade concrete has been used for construction
- Bays lengths are 6 m, 2.5, and 5 m respectively.



Assuming the linear variation of drift values from ground to top floor, calculate the drift at 2nd and 3rd stories also.

Q.4 a) An overhead transmission line at a river crossing is supported from two towers at heights 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of the conductor is 1 kg/m. **[5]**

Q.4 The tower for a transmission line is modeled by the truss shown. The crossed members in the center sections of the truss may be assumed to be capable of supporting tension only. For the loads of 1.8 kN applied in the vertical plane, compute the magnitude and nature of forces induced in members AB, DB, CD, FK and KC. **[15]**