5E5065
B. Tech. V Sem. (Main / Back) Exam., Dec. 2014
Civil Engineering
5CE5A Building Design

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. IS 1893 Part – I   2. IS 875 Part - III

UNIT – I

Q.1 (a) Describe the various types of dead loads and imposed loads to be considered for a residential building. [6]

(b) Differentiate between the "braced frame" and "shear-walled frame" system. Give neat sketches. [6]

(c) Differentiate between "centre of mass" and "centre of rigidity" [4]

OR

(a) What architectural features of a building lead to torsion under lateral loads? How the torsion could be avoided at the architectural planning stage? [5]

(b) With the help of suitable examples differentiate between vertical and lateral load resisting members of a building. [5]

(c) For the following simply supported beam (Fig.1) determine the equivalent u.d.l. in terms of "q" for bending moment [6]
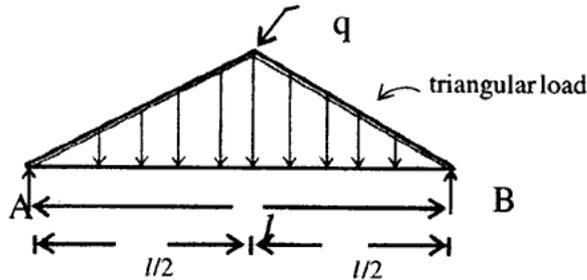

Fig 1

UNIT-II

Q. 2 (a) With the help of neat diagram define "Gust" and "Peak Gust" of wind. [6]

(b) Determine the average wind pressure on walls of a general building with flat roof without over hangs. The building is located in Surat. The topography of the area is fairly leveled and terrain is open with scattered obstructions of less than 10m height. The walls of the building hav total 10 openings of 1.10m x 1.00m size each. (Refer Fig 2) [10]
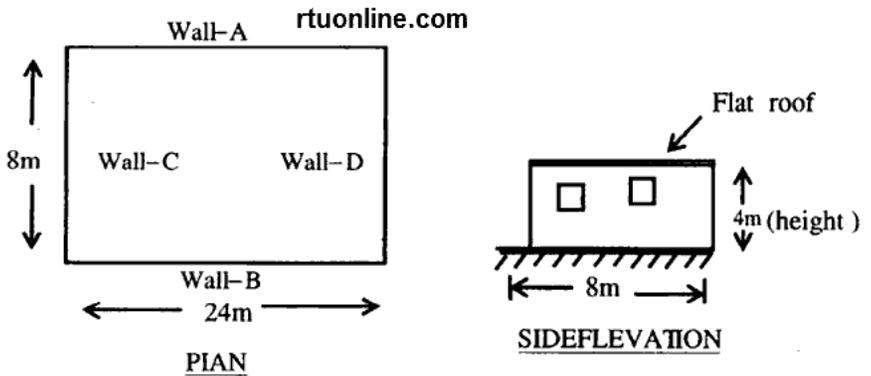

FIG.2

OR

For a rectangular clad building with pitched roof, determine: [16]

(a) Average design wind pressure on all the walls and

(b) Average design wind pressure on different portions of the roof.

The building is a farm building and located in Bikaner. Other details are as below: length = 18m; width (excluding overhangs) =10m; height = 3.5m; Roof angle = 5°; permeability of walls = 10% ; terrain category = 1;class of building = A and grand slope < 3°.

UNIT-III

Q. 3 A three storeyed symmetrical R.C.C (special moment resisting frame) school building situated at Bhuj has following data:

Plan dimension =7m ×7m; Storey height = 3.5m each,

Total weight of beams and columns at each storey is 130 kN and 50 kN respectively; Total weight of storey slab and roof slab is 250 kN and 300 kN respectively;

Live load on each floor = 503 kN /m^2. The structure is resting on hard rock.

Determine and show the total base shear and its distribution on each floor. Assume damping as 5%. [16]

OR

Determine the centre of mass, centre of rigidity, the design torsional eccentricity in X and Y direction and the torsional moments in X and Y direction for the building shown in Figure2. The building is single storeyed and covered with rigid diaphragm roof.

Height of walls = 4m;

Self weight of the roof = 3kN/m^2

Self weight of the walls = 5 kN/ m^2

Base shear due to earthquake loads = 330 kN.
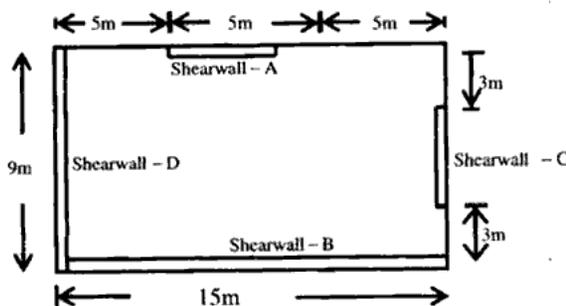
Relative lateral rigidity of walls C and D are 0.3 and 0.7 respectively, and that of walls A and B are 0.2 and 0.8 respectively. [16]

UNIT-IV

Q. 4 (a) With the help of neat typical sketches show the various seismic failure mechanisms of stone masonry walls. [8]

(b) Describe the importance and constructional details of plinth band and lintel bond. [8]

OR

Write short notes on the following - [4×4=16]

(a) Ponding of adjacent buildings

(b) Soft storey

(c) Strong column and weak beam design philosophy

(d) Ductile detailing

UNIT-V

Q. 5 (a) Differentiate between grid and ribbed floor. Give their neat typical sketches. [6]

(b) Give the procedure for design of cylindrical shell by beam theory. Develop the expression for calculation of second moment of area of cylindrical shell in beam theory. [10]

OR

(a) Calculate the stress in a cylindrical shell having radius = 6m; span = 24m; angle $\phi = 60°$; thickness = 50mm. [10]

(b) Discuss the advantages and disadvantage of prefabricated mass housing construction. [6]