

Ref. No. : Ex/CE/PE/B/T/421B/2024

Name of the Examinations: B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEMESTER - 2024

Subject : WIND AND EARTHQUAKE ENGINEERING

Time : Three
hours

Full Marks : 100

Use Separate Answer scripts for each Part

(50 Marks for each Part)

PART I (50 Marks)

1. A system is subjected to a random load having a PSD of $S_f(\omega)$. Obtain the PSD of the response of the system. (CO1) (10)
2. Obtain the peak response of a system in terms of background and resonant components subjected to a random gust load and identify the relation of the same with the IS code specification for gust load. (CO1) (12)
3. What are the general conditions for generation of cross-wind excitation in structures? State the effect of inflow turbulence on the separation behaviour of wind past a bluff body. (CO2) (13)
4. a) State the necessary condition for Galloping phenomenon seen in structures. (CO2)
b) Develop the governing equations for Buffeting seen in line like structures. (7 + 8)

or

4. Develop the governing equation to explain the flutter phenomenon in a 2-dof system subjected to fluid loading and explain the conditions for occurrence of flutter in terms of location of the center of mass, elastic center and center of lift. (CO2) (15)

[Turn over

B.E. Civil Engineering ,4 th Year 2 nd Semester Examination, 2024

Subject – Wind and Earthquake Engineering

Part - II (50 Marks)

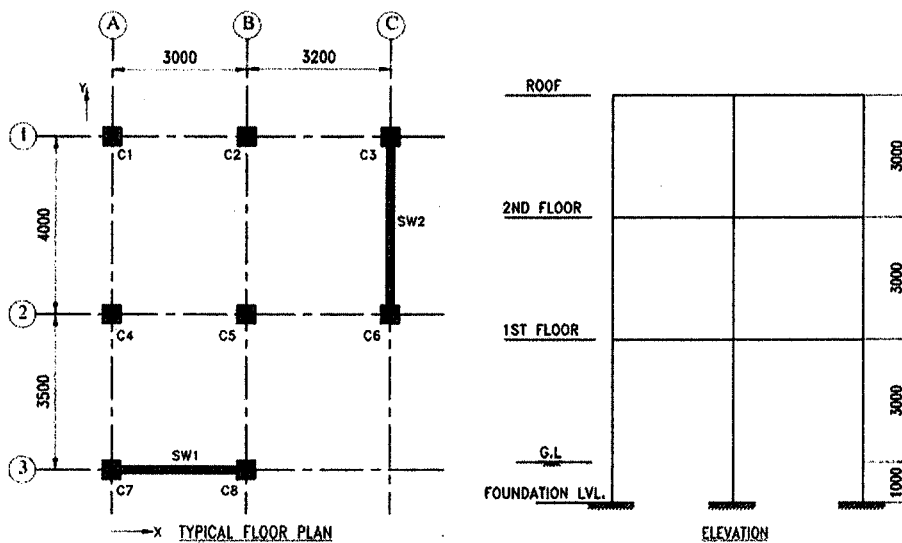
Full Marks- 100

Time: 3 hours

Answer any one question

(IS 456,875,1893,13920 and SP 6(1) are allowed in the hall)

1. Calculate the earthquake force at each storey level of the open frame by response spectrum method for earthquake force acting parallel to grid lines 1 , 2 and 3.



All column sections are 400 mm X 400 mm; shear walls are 150 mm thick. The slabs are 125 mm thick and live load on floors = 2 kN/m^2 and that on roof = 0.75 kN/m^2 . You need not consider weight of brickwork. Assume suitable values of other data, if required. Assume M30 concrete and Fe500 steel.

CO3 50

2. Design and detail a concrete shear wall 5000mm X 300 mm as per IS 13920 with the following data :

Factored axial load = 5500 kN , factored shear force = 400 kN, factored bending moment = 2500 kN-m.

Assume M35 concrete and Fe500 steel.

CO4 50