

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

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

Subject : WIND AND EARTHQUAKE
ENGINEERING

Time : 3 hours

Full Marks : 100

Part I(50 Marks)

Instructions : Use Separate Answer scripts for each Part

Q 1 a) Develop the necessary governing equations for a structure of non-circular cross section undergoing 'galloping' phenomenon and state the condition when it will be subjected to galloping.

b) Is it mandatory that galloping is observed only in structure with non-circular cross section? If not under what condition a circular section also can undergo galloping and state the governing equation for the same. (6 + 4)

Q 2 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 centre of mass, elastic centre and centre of lift. (15)

Q 3 Consider a building of plan dimension $d \times b$ and height 'h'. Explain the effect of inflow turbulence on the after-body flow behaviour and effective drag of the building due to variation in d/b ratio and height of the building. (10)

Q 4 a) If the PSD of a function $f(t)$ is expressed as $S_f(\omega)$ find the PSD for the function $\dot{f}(t)$ (7)

b) Define (i) Stationary and ergodic random process (ii) broad band, narrow band and white noise spectrum giving neat diagram of each one of the spectrum. (8)

[Turn over

B.E. Civil Engineering ,4 th Year 2 nd Semester Supplementary 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)

A two storied structure 4m x 4m is square in plan. Height of first floor above foundation level = 4.5 m and that of roof above first floor is 3 m. All the four columns are 300 mm x 300 mm, all the four beams are 250 mm x 300 mm and the slab thickness is 100 mm. All walls are 250 mm thick and the parapet is 1000 mm high. Live load intensity on floor is 2 kN/m² and that on roof is 1.5 kN/m². The structure is located in Delhi and is founded on medium soil. Do not consider any stair portion and calculate the seismic base and floor shears by response spectrum method.

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 = 4500 kN , factored shear force = 450 kN, factored bending moment = 2000 kN-m.

Assume M35 concrete and Fe500 steel.

CO4 50