

Name of the Examinations: B.E. CIVIL ENGINEERING FOURTH YEAR SECOND SEMESTER - 2018

Subject: WIND AND EARTHQUAKE ENGINEERING

Time : Three (3) hours

Full Marks : 100

Part I

Instructions: Use Separate Answer scripts for each Part

Answer all

1. (a) Explain the effect of wind speed on the drag and cross wind forces a building of rectangular plan form (width b and depth d) is subjected to.
(b) Explain the phenomenon of flow separation over a curved surface.
(c) A structural system is subjected to a random load $f(t)$. Derive the expression for the power spectral density of the system response $x(t)$ in terms of spectral density of the load and the Fourier transform of the impulse response. (4 + 4 + 12)

2. (a) Develop the expression for Gust Factor (as defined in IS 875 Part III, 2015) showing clearly the distinction between the 'Background' and the 'Resonant' part.
(b) What is the significance of the 'size reduction factor', S in the expression for Gust factor?
(c) Explain the significance of the 'Turbulence Correction Factor', ϕ in the expression for the Gust Factor. (15 + 2 + 3)

WIND AND EARTHQUAKE ENGINEERING

Time – 3hours

Full marks – 100

Figures in the margin indicates marks

Assume reasonable values of data , if required

PART II(60 marks)

5+(18+7) = 30

1. (a) What is the difference between wind and earthquake force
- (b) Calculate the base shear of a 60m tall uniform RCC chimney using 'Modal analysis technique'. Consider two lumped mass model and effect of both the modes. Grade of concrete M25. Find out also base shear as per IS 1893 – 2005. Compare and comment on the results.

OR

5+(18+7) = 30

2. (a) What is the effect of Height/Diameter ratio of a chimney on base shear.
- (b) Calculate the base shear of a 48m tall uniform RCC chimney using 'Modal analysis technique'. Consider three lumped mass model and effect of first mode only. Grade of concrete M25. Find out also base shear as per IS 1893 – 2005 .Compare and comment on the results.

5+ (18+7) = 30

3. (a) What is the effect of irregularity of a building on base shear.
- (b) Calculate the seismic base shear on a G+2 storied office building (20m x 24m) at Kolkata on pile foundation in soft soil . Apply 'Modal analysis technique' and consider effect of first and second modes only. Column spacing 4m in both the directions. Dead load = 12 KN/m² including self weight of slab, floor finish, ceiling plaster, brick works etc. Live load on floor = 3 KN/m² . Floor to floor height = 3m. First floor to top of the pile cap = 6m. Column dimensions = 400 x 400. M25 grade concrete. Find out also base shear as per IS 1893 – 2016 . Compare and comment on the results.

OR

5+ (18+7) = 30

4. (a) What is the importance of ductility of a RCC building under earthquake excitation?.
- (b) Calculate the seismic base shear on a G+2 storied office building (20m x 25m) at Kolkata on pile foundation in soft soil . Apply 'Modal analysis technique' and consider effect of first and second modes only. Column spacing 5m in both the directions. Dead load = 10 KN/m² including self weight of slab, floor finish, ceiling plaster, brick works etc. Live load on floor = 4 KN/m² . Floor to floor height = 3m. First floor to top of the pile cap = 6m. Column dimensions = 450 x 450. M25 grade concrete. Find out also base shear as per IS 1893 – 2016 . Compare and comment on the results.