Bachelor of Engineering Civil Engineering
Fourth year , Second Semester examination , 2017 (old)
Wind Engineering

Time: 3 hours

Full marks : 100

The figures in the margin indicate full marks

Assume reasonable value of any data if required

Answer any three questions

$33\frac{1}{3}$

1. A two storied two dimensional RCC frame is subjected to wind forces $F_1 = 0.5 + 0.2 \sin(0.015t)$ and $F_2 = 0.65 + 0.2 \sin(0.015t)$ at roof and first floor level. F_1 and F_2 are in tonne. Column size – 400mm x 500mm, Grade of concrete- M30. Storey height = 5 m Weight at roof and first floor level are 20 tonnes and 30 tonnes respectively. Consider a two lumped mass model. Calculate the tip displacement at time $t = T_1 / 10$, considering first mode only.

$33\frac{1}{3}$

2. A 75 m high RCC chimney has to be constructed in Kolkata at a place where no major obstructions exist. Calculate the design wind pressure at 30m and 75m level of the chimney using " Gust Factor method " of IS 875 – Part III . External and internal diameter of the chimney are 3.1m and 2.6m respectively. Grade of concrete M30. Calculate also the approximate bending moment and shear force at base level. Assume reasonable value of any data, if required.

$6\times5 + 3\frac{1}{3} = 33\frac{1}{3}$

3. Write short note on the following topics.
    (a) Across wind effect on buildings (b) Drag coefficient (c) Risk Coefficient
    (d) Gradient velocity (e) Turbulence (f) Vortex Shedding (g) Topography factor

$15\frac{1}{3} + 10 + 8 = 33\frac{1}{3}$

4. (a) What are the different concepts recommended in IS 875 – Part III to estimate wind pressure on structures. Discuss in detail with examples and make remarks on the applicability of these concepts . What are the limitations of these methods?.
    (b) What is " Wind Tunnel testing"?. Discuss in detail with examples " Closed Wind Tunnel Testing".
    (c) What is " Computational Fluid Dynamic(CFD) Analysis"?. Discuss in detail with examples