

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

I SEMESTER M.TECH. (STRUCTURAL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2017

SUBJECT: ANALYSIS AND DESIGN OF TALL STRUCTURES [CIE-5154]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.
- ✤ Use IS 456 2000 and IS 3920 are permitted

1A.	List the design criteria to be considered while designing tall buildings. Discuss at least 2 of them in detail pertaining to tall buildings in particular.	04
1B.	Write short notes on (i) High Performance concrete (ii) Light weight concrete (iii) Fibre reinforced concrete.	06
2.	Calculate the forces in the shear walls for the arrangement shown in Fig. Q2. The lateral force acts on longer side and has an intensity of 15 kN/m^2 . Assume the centre mass at the centre of geometry. Height of each storey is 3.0m.	10
3.	Calculate the critical buckling load for ground floor columns of a building frame shown in Fig. Q3. The column and beam are of 230 mm x 400 mm size, each story height is 5.0m, span L=4.2 m and lateral load/ story is 25 kN. The total live load and gravity load on the floor beam is 60 kN/m and on the roof beam is 40 kN/m. Also calculate the P-Delta effect by iterative method upto second iteration. Assume M40 grade concrete.	10
4.	For an outrigger braced structure as shown in the Fig.Q4, determine the moment in the core and draw BMD. The grade of concrete used is M60 for all elements. The size of core is 0.3×10 m, size of each outrigger is 0.3×5 m. The lateral wind load is 7 kN/m, H1= $3.5m \times 10$ storey, H2= $3.2m \times 25$ storey, H3= $3.0 \text{ m} \times 20$ storey and L1 =10 m, all column sizes are $1.0 \text{ m} \times 1.0 \text{ m}$.	10
5.	Calculate the height from top for chimney of external diameter 6.5 m and shell thickness 250mm and 1.25% steel reinforcement, where the windward face stress is zero. The wind pressure at site is 2.5 kN/m^2 . The total height of the chimney is 70m from ground level. Also design chimney foundation as full raft. Safe bearing capacity of soil is 250 kN/m ² , use M25 grade concrete and Fe415 grade steel. Sketch the reinforcement details.	10









