

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University

I SEMESTER M.TECH. (STRUCTURAL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2016

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 is permitted

1A.	What are the factors that affect the choice of structural form? Discuss with neat sketch at least 2 types of structural forms.	06
1B.	List the design criteria to be considered while designing tall buildings. Discuss at least 2 of them in detail pertaining to tall buildings.	04
2.	Determine the deflection at roof level due to lateral load for a multi-storied building given the following details; building has 25 story, each story of 3.2 m height, each frame has 3 bays each of 8 m span. All the beams are 300mm x 600mm in size and all the columns are 300mm x 600mm size. Wind pressure at the site may be assumed as 1.25 kN/m^2 . There are 4 Frames spaced at 6 m c/c, and 2 shear walls each 200 mm wide and 12m in length. Calculate also the load shared by frame and shear wall by approximate method without considering the frame - shear wall interaction forces. The materials are M40 grade concrete.	10
3.	A shear wall of length 6 m and thickness of wall is 250 mm is subjected to factored axial load, Pu=6000kN, factored bending moment, Mu=1500 kN-m and factored shear force, Vu=1000kN. Adopt M30 grade concrete and Fe415 grade steel design the wall by Limit state method as Tension and compression member. Sketch the reinforcement details.	10
4.	For an outrigger braced structure as shown in the Fig.Q4, determine the moment in the core and draw BMD and SFD. The grade of concrete used is M50 for all elements. The size of core is 0.3×10 m, size of each outrigger is 0.3×4.5 m. The lateral wind load is 6kN/m, H1= 3.2 m x 6 storey, H2= 3.2 m x 18 storey, H3= 3.0 m x 15 storey and L1 =10 m, all column sizes are 0.9 m x 0.9 m Also compare the results with and without outriggers and comment on the result obtained.	10
5.	Calculate the critical buckling load for ground floor columns of a building frame having 10 story and beam span of 4.5m. All the columns have size of 230mm x 450 mm and all beams have size of 230 mm x 400 mm, each story height is 4.0m, lateral load/ story is 30 kN. The total live load and gravity load on the floor beam is 45kN/m and that on the roof beam is 30 kN/m. Also calculate the P-Delta effect by iterative method upto second iteration and by amplification method. Assume M40 grade concrete.	10

Reg. No.



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Fig. Q4