Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

I SEMESTER M.TECH. (STRUCTURAL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2018

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 13920 are permitted

Q.no		Marks	CO'S
1A.	Write the various consequences due to differential shortening of vertical members in tall buildings. How to compensate the differential shortening?	**05**	**CO1**
1B.	Write briefly with neat sketch the behavior of Wall-frame interaction to lateral loads. Write typical bending moment and shear force diagrams in shear core and frames.	**05**	**CO2**
2.	For a 6-story knee braced frame shown in Fig.Q2, it is required to determine the drift at all floor levels for a uniform lateral load of 21 kN/story. Assume the elastic modulus as $2x10^5$ N/mm^2. The frame has span L = 5.5 m and each story height of 3.20 m. The area of the diagonal bracings, columns and beams are 3000mm^2, 3500 mm^2 and 3000mm^2 respectively. The moment of inertia of the beams are $3.2x\ 10^8$ mm^4. Comment on the results obtained. m=1.5m	**10**	**CO3**
3.	For a outrigger braced structure as shown in the Fig.3 Determine the moment in the core and deflection at the top. The grade of concrete used is M60 for all elements. Compare the result if outrigger was not present. The size of core is 0.25m x 10 m, size of outrigger is 0.25 x 6m. The lateral wind load is 10 kN/m, H1= 3.0 x 10, H2=3.0 x 25 and H3= 3.0x30, all column sizes are 0.60m x 0.90m. L1=12 m.	**10**	**CO4**
4.	Calculate the critical buckling load for ground floor columns of building frame with 6 stories with column and beam sizes of 250 mm x 400 m, span L = 4 m and each story height is 4.2m and lateral load/ story is 250 kN. The total live load and gravity load on the floor beam is 50 kN/m and on the roof beam is 30 kN/m. Also calculate the P-Delta effect by approximate amplification method and by Iterative P-Delta analysis up to second iteration. Adopt M30 grade concrete.	**10**	**CO4**
5.	An RCC chimney is 40 m above the ground and has an external diameter of 3.5m, shell thickness 175 mm, assume a wind pressure of 2kN/m^2 uniform over the entire height. Find the stress in concrete and steel due to wind and dead load at 20 m from top and also at the base. If the shell is reinforced with 1.5% longitudinal steel. Adopt M_{25} grade concrete and Fe_{415} grade steel.	**10**	**CO5**

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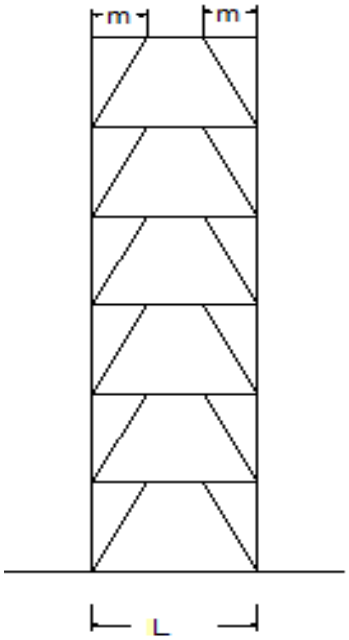

Fig.Q2

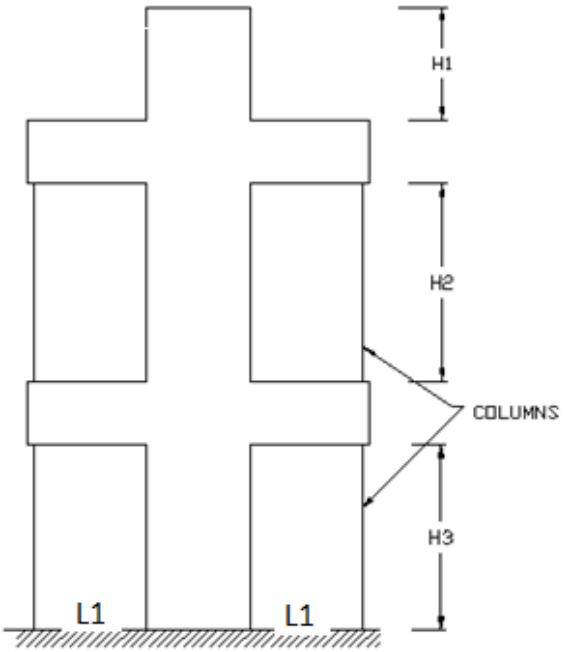

Fig.Q3