

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



I SEMESTER M.TECH (STRUCTURAL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: ANALYSIS AND DESIGN OF TALL STRUCTURES [CIE 547] REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ANY FIVE FULL the questions.

♦ Missing data may be suitable assumed. Use of IS456-2000 is permitted

1A.	Write short notes on (i) Sequential loading (ii) High performance concrete (iii) Light weight concrete.	06	
1B.	Derive an equation for lateral sway of tall building frame with uniform material and structural property subjected to uniform lateral load.	04	
2.	A two bay 5 story frame has the following particulars; all elements of frame are 300mm x 500mm in size. The height of each storey is 3.5 m and beam spans are 6m. The live load on all beams is 15kN/m and dead load on all beams is 20 kN/m. The building is to be designed for lateral load due to wind and vertical gravity loads. The design wind pressure may be assumed = 1.0 kN/m^2 . Determine the moments in the beam to due to vertical gravity load by substitute frame method and due to horizontal load by portal frame method. Spacing between frames is 4 m c/c.	10	
3.	A 6 story double diagonally braced frame as shown in Fig .Q3 It is required to determine the drift at all floor levels for a uniform lateral load of 50 kN/story. Assume the elastic modulus as $2x10^5$ N/mm ² . The frame has span L = 3.5 m and each story height of 3.0 m. The area of the diagonal bracings, columns and beams are 2400mm ² , 1800 mm ² and beams 1800mm ² respectively.	10	
4.	A circular chimney is 80 m height, has a constant shell thickness of 220 mm. The exterior diameter is 6.5m and is reinforced with 1.5% steel. The wind pressure at site may be assumed as 1.5 kN/m^2 , the shape factor for chimney is 0.67 and M30 grade concrete is used. Determine the section from top where stress distribution is such that wind ward force stress is zero. Also evaluate max. stress in concrete and steel at the section and also at base.	10	
5.	Calculate the critical buckling load for ground floor columns of a building frame shown in Fig. Q5. The column and beam are of 250 mm x 500 mm size, each story height is 4.0m, span L=4.2 m and lateral load/ story is 40 kN. The total live load and gravity load on the floor beam is 60 kN/m and on the roof beam is 50 kN/m. Also calculate the P-Delta effect by iterative method upto second iteration and by	10	
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		amplification factor method. Assume M20 grade concrete.	
	6.	The plan of the structure is as shown in the Fig.Q6, is of a 45 story 175 m high wall- frame structure. The lateral load resistance to wind acting on its longer side is provided by six rigid frames and a central core. It is required to determine deflections at top and forces in frame and core for a wind loading of 1.0 kN/m^2 , consider the wall frame interaction forces, given are the structural data as below: All columns have Ixx=0.10 m ⁴ and beams have Ixx=0.015m ⁴ . The moment of inertia of the core is 300 m ⁴ , assume E=2x10 ⁸ kN/m ² .	10

