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.	Explain with neat sketch the behavior of (i) Coupled Shear wall Structure (ii) Suspended Structure.	06	CO2
1B.	List the innovative design concepts to achieve better and more efficient methods to resist lateral load in tall buildings.	04	CO1
2.	A two bay 6 story frame has the following details; all elements of frame are 230mm x 600mm in size. The height of each story is 3.5 m and beam spans are 6m. The live load on all beams is 15 kN/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 = $2.2 \text{ kN/m}^2$ . 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 for any intermediate frame at level 3. Spacing between frames are 5 m c/c	10	CO3
3.	A shear wall of length 6.5 m, wall thickness of 200 mm is subjected to factored axial load, Pu=4000kN, factored bending moment, Mu=2500 kN-m and factored shear force, Vu=900kN. Adopt M30 grade concrete and Fe415 grade steel, design the shear wall by Limit state method as Tension and compression member. Sketch the reinforcement details.	10	CO3
4.	The plan of the structure is as shown in the Fig.Q4, is of a 55 story 220 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 2.0 kN/m <sup>2</sup> , consider the wall frame interaction forces, given are the structural data as below: All columns have size of 600mm x 600mm and beams have size of 500mm x 900mm. The moment of inertia of the core is 500 m <sup>4</sup> , adopt M60 grade concrete.	10	CO4
5.	A chimney foundation has to be designed as full raft for chimney external diameter of 5.0m. Total axial load is 6000 kN at the base and total moment at base is 5500 kN-m. Safe bearing capacity of soil is 200 kN/m2, use M25 grade concrete and Fe415 grade steel. Sketch neatly the design details.	10	CO5



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL (A constituent unit of MAHE, Manipal)



Fig. Q4