Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER III (NEW) – EXAMINATION – WINTER-2016

Subject Code: 2732005 **Date:25/10/2016**

Subject Name: Design of Tall Structures

Time:02:30 pm to 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Following IS codes and special publications are allowed**

i) IS800ii) IS875 iii) IS1893iv) SP 16 v) IS456vi) Steel table

Q.1 (a)	Discuss the difference in behavior of coupled shear wall and solid shear wall.	(07)
Q.1 (b)	Explain the buckling of tall building under its own weight.	(07)
Q.2 (a)	Discuss factors affecting hinge properties for Non Linear static push over analysis.How capacity and demand spectrum can be obtained?	(07)
Q.2 (b)	What are factors affecting design of tall structures?	(07)
	OR	
Q.2 (b)	Explain in brief various tube structural systems used in Tall buildings along with their recent application.	(07)
Q.3 (a)	Give the classification of industrial chimneys.	(07)
Q.3 (b)	What are the checks to be carried out for stability analysis of foundation of a chimney? Explain any one in detail.	(07)
	OR	
Q.3	Design a chimney of height 70 m and check the stresses at base. Data given: a) External diameter at top = 4.0 m b) External diameter at base = 4.8 m c) Shell thickness at top = 200 mm d) Shell thickness at base = 400 mm e) Wind Intensity=1.8 kN/m^2 throughout f) Thickness of fire brick lining = 100 mm g) Air Gap=100 mm h) Temperature difference = 70 °C i) Coefficient of thermal expansion = 11 x 10^{-6} / °C j) E_s=210 x 10^{3}N/mm^2 k) Density of brick lining = 20 kN/m^3 l) M35 grade of concrete and Fe 415 grade steel.	(14)
Q.4 (a)	Classify transmission line towers according to use.	(07)
Q.4 (b)	How the total height of a transmission line tower is is calculated? Explain in brief the factors governing the height of transmission line tower.	(07)
	OR	
Q.4	A hyperbolic cooling tower of 60 m height has following data Top diameter = 40 m	(14)

Throat diameter = 35 m
Density of concrete = 25 kN/m^3
Z_{top} = 15 m
Analyze for membrane forces at the base section of tower and design suitable thickness and reinforcement for bottom of the section.

Q.5 (a) Explain in brief various floor systems in RCC tall buildings. (07)

Q.5 (b) Enlist and describe the different types of communication towers based on their structural action. (07)

OR

Q.5 A microwave tower of height 50 m is to be built near Vadodara (basic wind speed 44 m/sec) on a level ground. It has to carry 1 circular disc of 3.0 m diameter on top. Other data is as follows. (14)

a) Width of top of tower = 3.5 m
b) Weight of platform on top = 1.0 kN/m^2
c) Weight of antenna and fixture = 9 kN
d) Weight of railing on top = 0.5 kN/m
e) Weight of ladder and cage = 0.6 kN/m
f) Self-weight of truss = 5 kN/m
g) Live load = 0.75 kN/m^2
h) Weight of miscellaneous items = 2.5 kN.
i) Terrain category III and Class of structure is B

Configure the tower and calculate the design loads in each panel. Give design details of the top panel only.