PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Summer 2017 - 18 Examination

Semester: 2   Date: 28/05/2018
Subject Code: 03209181   Time: 02:00PM TO 04:30PM
Subject Name: Analysis And Design Of Tall Structures   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1	A) Explain shear wall frame interactions.	**(05)**
	B) Give the classification of industrial chimneys.	**(05)**
	C) List types of energy dissipation devices for tall buildings. Explain any one in detail.	**(05)**
Q.2	**Answer the following questions**. (Attempt any three) (Each five mark)	**(15)**
	A) Discuss the factor responsible for slimming down the weight of structural frame.	
	B) What do you mean by tall buildings? Mention the name of four tall buildings in world along with type of structural system used.	
	C) What are factors affecting design of tall structures?	
	D) Explain in brief various floor systems in RCC tall buildings.	
Q.3	A) Explain in brief various tube structural systems used in Tall buildings along with their recent application. Explain in brief the outrigger system along with their recent application.	**(07)**
	B) Discuss the various checks to be carried out for stability analysis of foundation of a chimney.	**(08)**

OR

B) Design a chimney of height 80 m and check the stresses at base in bars. Data given:
a) External diameter at top = 4 m
b) External diameter at base = 5 m
c) Shell thickness at top = 200 mm
d) Shell thickness at base = 400 mm
e) Wind Intensity=1.5 kN/m^2 throughout
f) Thickness of fire brick lining = 100 mm   **(08)**
g) Air Gap=100 mm
h) Temperature difference = 75 °C
i) Coefficient of thermal expansion = 11 x 10^{-6} / °C
j) Es =210 x 103 N/mm^2
k) Density of brick lining = 20 kN/m^3
l) M25 grade of concrete and Fe 415 grade steel.

Q.4	A) List the various factors governing the height and configuration of transmission line tower. Also sketch the various types of bracing system used for transmission line tower.	**(07)**

OR

A) Analyze for membrane forces at the base section of hyperbolic cooling tower and design suitable thickness and reinforcement for bottom section using following data.
a. Height of hyperbolic cooling tower = 84 m
b. Top diameter = 45 m
c. Throat diameter = 42 m
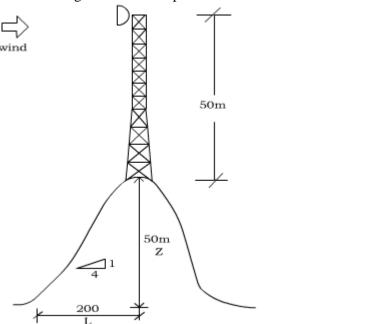d. Density of concrete = 24 kN/m^3
e. Z top = 20 m   **(07)**
f. Values of f(ξ) are given in the following table.

TABLE 12.1 Values of Function $f(\varepsilon)$

ε	$f(\varepsilon)$	ε	$f(\varepsilon)$
0.000	0.275	0.275	1.159
0.010	0.040	0.300	1.278
0.020	0.080	0.325	1.401
0.030	0.120	0.350	1.529
0.040	0.160	0.375	1.661
0.050	0.200	0.400	1.800
0.060	0.241	0.425	1.945
0.070	0.281	0.450	2.111
0.080	0.321	0.475	2.261
0.090	0.362	0.500	2.432
0.100	0.403	0.550	2.814
0.110	0.444	0.600	3.261
0.120	0.485	0.650	3.802
0.130	0.526	0.700	4.480
0.140	0.567	0.750	5.374
0.150	0.609	0.800	6.642
0.175	0.725	0.850	8.638
0.200	0.822	0.900	12.418
0.225	0.932	0.950	23.151
0.250	1.044	1.000	∞

$$f(\varepsilon) = \left[\frac{2\varepsilon}{1-\varepsilon^2} + \log\left(\frac{1-\varepsilon}{1+\varepsilon}\right)\right]$$

B) A microwave tower of height 50 m is to be built at out-skirt of Rajkot over a hilltop. It has to carry one hemispherical dome of 2m diameter weighing 10kN at the top. The height of the hill is 50m with a gradient of 1 in 4. Other data is as follows.

a. Width of top of tower = 2 m

b. Base width = 6 m

c. No of Panels = 20

d. Terrain category = 3

Configure the tower and calculate the design loads in each panel.

(08)