Enrollment No:	Exam Seat No:
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# **C.U.SHAH UNIVERSITY**

# Winter Examination-2018

**Subject Name: Structural Design-II** 

Subject Code: 4TE08STD1 Branch: B.Tech (Civil)

Semester: 8 Date: 19/10/2018 Time: 10:30 To 01:30 Marks: 70

#### **Instructions:**

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

## Q-1 Attempt the following questions:

(14)

- a) List the various loads acting in a structure.
- **b**) Define stiffness.
- c) Mention the two types of stability of structures.
- **d**) What are the principles in Limit State Design?
- e) Give the stages involved in a structural design.
- **f)** Write the application of retaining wall.
- g) List the types of flexible joints.
- **h)** What are the categories of tanks for retaining water?
- i) Enlist the applications of gantry girder.
- j) What are the elements of a plate girder?
- **k**) Define self supporting steel chimney.
- 1) Enlist the uses of steel towers.
- m) List the purposes for the use of foot over bridge.
- **n**) Define towers.

# Attempt any four questions from Q-2 to Q-8

**Q-2** 

Using IS: 456 (Part 3) provisions, determine wind force on any intermediate (14) frame of a multistory building. Plot the wind pressure distribution diagram along



height of the building and hence nodal forces at each floor level. Use the following data:

Length of building = 48 m

Width of building = 40 m

Height of building = 34 m

Storey height = 3 m

Frame spacing = 4 m in both directions

Location = Chennai

Terrain category = 2

Slope of ground  $= 10^{\circ}$ 

Height of hill = 900 m

Location from crest = 200 m

Design life period = 55 years.

#### Q-3 Attempt all questions

- (a) Design a circular underground water tank with flexible base for a capacity of 5,00,000 litres below the ground level. Saturated unit weight of soil=  $17 \text{ kN/m}^3$ , density of water=  $10 \text{ kN/m}^3$  and  $\emptyset = 30^\circ$ . Use M20 grade concrete and Fe415 grade steel.
- (b) Explain the various methods of analysis or structural analysis in R.C. Framed buildings. (04)

#### **Q-4**

Design an underground tank of size 3 m x 8 m x 3 m for the following data. (14) Saturated unit weight of soil=  $16 \text{ kN/m}^3$ , density of water=  $10 \text{ kN/m}^3$  and  $\emptyset = 30^\circ$ . Water table can raise upto ground level. Use M25 concrete for tank, M20 concrete for roof slab and Fe415 grade steel.

#### Q-5 Attempt all questions

(a) Design and detail counterfort retaining wall for the following data: (10)

Angle of repose =  $30^{\circ}$ 

Unit weight of soil =  $18 \text{ kN/m}^3$ 



Height of wall above ground level = 7m

SBC of soil =  $150 \text{ kN/m}^2$ 

Coefficient of friction between the base and the soil is 0.60. Use M20 grade of concrete and Fe 415 steel.

**(b)** Describe in detail about the stability of cantilever retaining wall.

(04)

(04)

#### Q-6 Attempt all questions

- (a) Design a welded plate girder for a simply supported bridge deck beam with clear span of 20m, subjected to following, Dead load including self weight = 20 kN/m Imposed Load = 10 kN/m, Two moving loads = 150 kN each spaced 2m apart. Assume that top compression flange of the plate girder is restrained laterally and prevented from rotating. Use mild Steel with fy = 250 MPa. Design an unstiffened plate girder with thick webs.
- **(b)** Explain with neat sketches the different types of truss girders.

#### Q-7 Attempt all questions

(a) Design a foot over bridge for the following data: Type of truss: warren type (10)

Span of roof truss: 30m

Width of walk way: 3m

Panel length: 3m Live load: 4 kN/m<sup>2</sup>

Floor finish: 1 kN/m<sup>2</sup>

Rcc Slab thickness: 120 mm thick, Fy= 250

Assume Suitable Data if required.

(b) List various steps involved in the design of angle purlin and I section purlin. (04)

## Q-8 Attempt all questions

(a) Explain various types of transmission line towers. (07)

(b) Explain lining of chimneys and load acting on a chimney. (07)

