

END TERM EXAMINATION

SIXTH SEMESTER [B.TECH] MAY-JUNE 2018

Paper Code: ETCE-310

Subject: Advanced Structural Design
(Batch 2013 Onwards)

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q no. 1 which is compulsory.
Select one question from each unit. Assume missing data, if any.

- Q1 (a) Write short note on fatigue effects in gantry girders. (5)
(b) Explain various types of seismic waves. (5)
(c) Classify different types of earthquakes. (5)
(d) Define the following terms:- (5)
(i) Tendon
(ii) Strands
(iii) Cables
(iv) Bonded tendons
(v) Post tensioning
(e) Write short note on Box Culvert. (5)

Unit-I

- Q2 State the objectives and guidelines of earthquake resistant design as per IS-specification. Discuss on dynamic analysis of structure. (12.5)

OR

- Q3 Discuss ductile detailing for columns subjected to bending and axial loads. Explain horizontal and vertical distribution of seismic forces, with analysis on assumed data. (12.5)

Unit-II

- Q4 Explain the method and design steps for designing vertical stem, toe slab and heel slab for a T shaped cantilever retaining wall. What will be the change in design if counterforts are provided at regular interval towards the side of backfill? (12.5)

OR

- Q5 For an underground water tank 4 m x 10 m x 3 m deep, the subsoil consists of sand having angle of repose of 30° , and saturated unit weight of 17 kN/m^3 . The water table is likely to rise up to ground level. Use M20 concrete and HYSD bars. Design- (12.5)

(i) Long wall

(ii) Short wall

Unit-III

- Q6 A simply supported prestressed concrete beam of rectangular cross-section $400 \text{ mm} \times 600 \text{ mm}$, is loaded with a uniform distributed load of 256 kN over a span of 6 m . Sketch the distribution of stresses at mid span and end sections if the prestressing force is 1920 kN and tendon is eccentric, located at 200 mm above the bottom fibre. (12.5)

OR

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P.1/2

- Q7 (a) Explain (2)
 (i) Stress concept (3)
 (ii) Strength concept (3)
 (iii) Balanced load concept (4.5)
 (b) What are the advantages of prestressed concrete?

Unit-IV

- Q8 For an elevated cylindrical steel tank with hemispherical bottom for 160000 litres capacity, the tank has conical roof. The ring beam of the tank is at a height of 10m from the ground level. The tank is to be built at Delhi. Take $f_y=250\text{N/mm}^2$. Design- (12.5)
 (i) Thickness of plate in cylindrical and hemispherical portion.
 (ii) Joints of tank for cylindrical and hemispherical portion.
 (iii) Connection for hemispherical bottom to cylindrical portion.
- OR**
- Q9 (a) What are the different types of load acting on transmission line towers? Explain. (4)
 (b) Explain the two design condition of transmission towers. (3)
 (c) What is the effect of temperature variation in cable geometry? (3)
 (d) Write short note on analysis of transmission towers. (2.5)
