

Printed Pages : 4

ECE601

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2454

Roll No.

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B.Tech.

(SEMESTER-VI) THEORY EXAMINATION, 2012-13

DESIGN OF CONCRETE STRUCTURES – II

*Time : 3 Hours]**[Total Marks : 100*

SECTION – A

1. Attempt all question parts : 10 × 2 = 20
- (a) What type of precast prestressed concrete sections do you recommend for covering large spans ?
 - (b) What are the salient design features of prestressed concrete one way and two ways slab panels ?
 - (c) What are the main requirements of a foundation system for a structure ?
 - (d) Why is it desirable to eliminate eccentricity in loading on a footing, wherever possible, by means of proper proportioning ?
 - (e) What is meant by surcharge and inclined surcharge ?
 - (f) What is the purpose of retaining wall ?
 - (g) Define the term 'tank' and classify them.
 - (h) What are the factors that should be considered while designing R.C.C. tank ?
 - (i) Define the terms : tendon, anchorage, pre-tensioning and post-tensioning.
 - (j) State the assumptions made in prestressed concrete design.

2454

1



SECTION – B

2. Attempt any **three** question parts : **10 × 3 = 30**

- (a) (i) Explain briefly the advantages of using prestressed concrete floor slabs mentioning their common applications.
- (ii) What are advantages of prestressing flat slab floor panels ? Sketch the cross section of a simple flat slab showing the typical cable profile.
- (b) Design a plain concrete footing for a column, 300 mm × 300 mm, carrying an axial load of 330 kN (under service loads, due to dead and live loads), assume an allowable soil bearing pressure of 360 kN/m² at a depth of 1.0 m below ground. Assume M20 concrete and Fe 415 steel.
- (c) Design a suitable counterfort retaining wall to support a level backfill, 7.5 m high above the ground level on the toe side. Assume good soil for foundation at a depth of 1.5 m below the ground level with a safe bearing capacity of 170 kN/m². Further assume the backfill to comprise granular soil with a unit weight of 16 kN/m³ and an angle of shearing resistance of 30°. Also assume the coefficient of friction between soil and concrete to be 0.5. Use M25 grade concrete and Fe 415 grade steel.
- (d) Design a circular tank for a capacity of 500 KL with flexible joint at the base. Use (i) mild steel reinforcement (ii) HYSD bars.
- (e) What are the advantages and disadvantages of prestressed concrete over the reinforced concrete construction ?

SECTION – C

Attempt **all** questions : **10 × 5 = 50**

3. Attempt any **one** part : **10**

- (a) A simple flat slab 12 m by 9 m is supported by four columns so placed as to form a symmetrical rectangular grid, 7 m by 6 m, the cantilevers formed are 2.5 and 1.5 m in the long and short directions of the slab. The live load on the slab is 1 kN/m². Prestressing cables consisting of four wires of 5 mm carrying an effective force of 100 kN are available for use. Design the numbers of cables required and arrange them suitably in the two principal directions.

- (b) Design a continuous prestressed flat slab floor of overall size 16 m by 16 m, the columns are spaced at 7.5 m intervals in the perpendicular direction. The floor slab has to support a superimposed load of 3 kN/m^2 , freyssinet cables, consisting of 12 wires of 5 mm diameter stressed to 1000 N/mm^2 , are available for use. Determine the number of cables required and their spacing in each direction.

4. Attempt any one part :

10

- (a) Design an isolated footing for a square column, $450 \text{ mm} \times 450 \text{ mm}$, reinforced with $8-25\phi$ bars and carrying a service load of 2300 kN. Assume soil with a safe bearing capacity of 300 kN/m^2 at a depth of 1.5 m below ground. Assume M20 grade concrete and Fe 415 grade steel for the footing and M25 concrete and Fe 415 steel for the column.
- (b) Design a reinforced concrete footing for a 230 mm thick masonry wall which supports a load of 200 kN/m under service loads. Assume a safe soil bearing capacity of 150 kN/m^2 at a depth of 1 m below ground. Assume M20 grade concrete and Fe 415 grade steel.

5. Attempt any one part :

10

- (a) Briefly describe the behaviour of the various elements of a cantilever retaining wall and a counterfort retaining wall.
- (b) Suggest suitable proportions for a counterfort retaining wall to support difference in ground elevation of 9 m, the foundation depth may be taken as 1.5 m below ground level, with a safe bearing capacity of 160 kN/m^2 . Assume a level backfill with a unit weight of 16 kN/m^3 and an angle of shearing resistance of 30° . Also assume coefficient of friction, $\mu = 0.5$, between soil and concrete. Check the stability of the wall.

2454

3

P.T.O.

6. Attempt any **one** part.

10

- (a) Design a rectangular tank resting on ground for a capacity of 80 kL. Use M25 concrete and Fe 415 grade steel.
- (b) Design an underground rectangular tank 10 m × 6 m × 3 m deep. The tank is covered at top. Take the density of soil as 16000 N/m³ and angle of repose as 30°. Use M25 concrete and Fe 415 grade steel.

7. Attempt any **one** part :

10

- (a) A prestressed concrete beam is required to carry a total UDL of 30 kN over a span of 12 m using a rectangular section, determine the suitable dimensions of the beam. Calculate the size of the tendon and its location. Use M30 concrete and permissible stress in tendon material is 1000 N/mm².
- (b) A prestressed beam with width of section 150 mm and depth of section as 350 mm is used over a span of 6 m and supports a UDL of 4 kN/m including self-weight of beam. Beam is prestressed by a cable carrying a force 200 kN and at an eccentricity of 50 mm. Determine the location of thrust line giving position at quarter and central span sections.