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B.TECH. DEGREE EXAMINATION, MAY 2014

Seventh Semester

Branch : Civil Engineering

DESIGN OF CONCRETE STRUCTURES – II (C)

(Old Scheme – Prior to 2010 Admissions)

[Supplementary]

Time : Four Hours Maximum : 100 Marks

Use of relevant IS codes permitted.
Missing data may suitably be assumed.

Answer **all** *questions.*
Each question carries 20 *marks.*

1. (a) Briefly describe the different methods of prestressing.

   (b) Design a rectangular prestressed concrete beam for the following data :

   Load intensity = 8 kN/m.
   Effective span = 10 m.
   Characteristic strength of concrete = 45 MPa,
   Compressive strength at transfer = 30 MPa,
   Losses = 15%, Characteristic strength of tendons = 1800 MPa.

   (4 + 16 = 20 marks)

Or

2. (a) Explain the grades of concrete and steel used in prestressing. Justify.

   (b) In a rectangular prestressed concrete beam 300 mm × 400 mm, the eccentricity of prestress is 100 mm. If the net losses are 15% and final prestressing force is 500 kN, find the initial and final stresses due to prestress alone.

   (5 + 15 = 20 marks)

3. A counterfort retaining wall has to retain a level fall of 6 m. above GL. Good SBC = 200 kN/m^2 available at 1.6 m below GL. Unit wt. of soil is 16 kN/m^3 and coefficient of friction = 0.6. The stem slab is 350 mm thick and spacing of counterforts is 3.0 m. Design the stem and counterfort and sketch the reinforcement details. Use M 20 and Fe 415.

Or

Turn over

4. Design a Cantilever retaining wall given the following particulars :

Height of retention above base = 4.0 m. Unit wt. of soil = 18 kN/m^3 ; Angle of repose = 30°. The backfill is level and there is no surcharge. SBC of soil = 200 kN/m^2. Coefficient of friction = 0.6. Adopt M 20 Concrete and Fe 415 steel.

(20 marks)

5. A circular beam of diameter 14 m is supported continuously on sin columns. It carries a u.d.l. of 20 kN/m. Determine the bending moment, twisting moment and shear force at salient points and plot.

(20 marks)

Or

6. A continuous beam of three equal spans AB = BC = CD = 12 m is simply supported at the ends A and D. The beam carries a superimposed load of 14 kN/m. Design the beam and sketch the reinforcement. Use M 25 and Fe 415.

(20 marks)

7. Design a spherical dome over a circular water tank for the given data : (i) Inside diameter of the tank = 12 m ; (ii) Rise of dome = 4 m ; (iii) LL = 1.5 kN/m^2. The dome has an opening of 1.8 m diameter at its crown. A lantern is provided at its top which causes a DL of 22 kN acting along the circumference of opening. Use M 20 and Fe 415.

(20 marks)

Or

8. (a) Derive the expressions for membrane stresses in Conical dome.

(5 marks)

(b) Design a conical roof over a 12 m dia temple hall with a rise of 2.5 m. Assume live load = 2 kN/m^2. The dome is supported on 500 mm wide continuous support on periphery. Use M 20 and Fe 415.

(5 + 15 = 20 marks)

9. Design a rectangular water tank open at top, resting on ground having a size of 10.0 m × 4.0 m × 3.0 m. Use M 25 and Fe 415. Sketch the reinforcement details.

Or

(20 marks)

10. Design a circular water tank resting on ground with flexible base for a capacity of 500,000. litres. Depth of storage including freeboard is 4.0 m. Use M 25 and Fe 415. Sketch the reinforcement details.

(20 marks)

[5 × 20 = 100 marks]