LIB
19/11/13 FN

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 82327

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Elective

Structural Engineering

ST 9263/ST 963/UST 9163/10211 SEE 71 —
PRESTRESSED CONCRETE

(Regulation 2009/2010)

Time : Three hours Maximum : 100 marks

(1) Use of IS 1343 – 1980 is permitted.

(2) Assume suitable data where found necessary.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why is mild steel not suitable for prestressed concrete construction?

2. List any four types of pretensioning losses.

3. Compare the shear carrying capacity of RCC beam and PSC beam.

4. Define the term isobars' with reference to prestressed concrete.

5. List the different methods of achieving continuity of continuous prestressed concrete beams.

6. What is meant by secondary moment in the analysis of continuous prestressed concrete beams?

7. When prestressing is advantageous in columns?

8. Give some advantages of PSC piles over RCC piles.

9. What is meant unpropped construction with reference to composite prestressed concrete structures?

10. Mention the merits of partial prestressing.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain why high strength concrete and high tensile steel are required in prestressed concrete construction. (8)

(ii) With a neat sketch, explain the Magnel Blaton system of prestressing. (8)

Or

(b) A simply supported prestressed concrete beam spanning over 10 m is of section 500 mm × 750 mm. The beam is prestressed by a parabolic cable having an eccentricity of 200mm at the centre of span and zero at the end supports. The effective force in the cable is 1600 kN. If the beam supports load of 40 kN/m including the self weight

(i) Calculate the extreme fibre stresses at the mid span section. (10)

(ii) Calculate the force required in the cable having the same eccentricity to balance a total load of 50 kN/m on the beam. (6)

12. (a) Design a prestressed concrete pretensioned beam with straight cables to carry a load of 15kN/m over a span of 12 m. Width of the beam may be taken as 300 mm. (16)

Or

(b) The end block of post tensioned concrete beam 250 mm × 300 mm is subjected to concentric prestressing force of 800 kN by a Freyssinet cone of area 12000 mm^2. Design and detail the end block. (16)

13. (a) A two span prestressed concrete continuous beam has each span of 15 m and the linear cable profile has the following eccentricities :

Eccentricity at end support section = 100 mm below c.g.c

Eccentricity at mid span section = 360 mm below c.g.c

Eccentricity at mid support = 200 mm above c.g.c

If the prestressing force is 2100 kN, sketch the pressure line due to prestressing. (16)

Or

(b) (i) Explain the following terms with examples : (10)

(1) Linear transformation.

(2) Concordant profile.

(ii) State the advantages of prestressed concrete continuous members. (6)

14. (a) (i) Design a tension member of length 18 m carrying an axial load of 1000 kN. Use M45 grade concrete and steel of characteristic strength 1500 N/mm^2. Take the permissible tensile stress as 2 N/mm^2. (8)

(ii) Discuss the design of compression member subjected to axial load and bending moment. (8)

Or

(b) Write short notes on :

(i) Design of prestressed cylindrical water tanks. (8)

(ii) Design of prestressed concrete pipes. (8)

15. (a) Determine the stresses at various stages of loading for a composite prestressed concrete beam for the following data : (16)

Span of the beam = 12m

Size of prestressed concrete web = 100 mm × 700 mm

Size of flange = 700 mm × 100 mm

Prestressing force = 2250kN

Eccentricity of straight tendon below c.g.c = 150 mm

Live load on the section = 10 kN/m

Prestressed beam is unpropped during casting of in-situ slab.

Or

(b) (i) With neat sketches explain the types of composite construction and state the advantages of such construction. (10)

(ii) Explain partial prestressing and state where it is used. (6)

———————