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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Seventh Semester

Civil Engineering

CE 6702 — PRESTRESSED CONCRETE STRUCTURES

(Regulations 2013)

(Common to PTCE 6702 – Prestressed Concrete Structure for B.E. (Part-Time) – Sixth Semester – Civil Engineering – (Regulations – 2014))

Time : Three hours Maximum : 100 marks

Use of IS1343 is permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List out the various types of losses in prestressing.
2. Write the applications of prestressed concrete.
3. Differentiate between pre-tensioning and post-tensioning.
4. Write the minimum concrete strength requirements prescribed for prestressed concrete members in IS : 1343 code.
5. Write the factors influencing deflection.
6. State the methods available to calculate anchorage zone stresses.
7. Define composite beam.
8. Write the concept of concordant cable.
9. List the advantages of partial prestressing.
10. Write the effect of prestressing in circular water tanks.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the development of prestressed concrete and enumerate the advantages of prestressed concrete.

Or

(b) Calculate the loss of prestress due to elastic shortening for a post tensioned beam of size 250 mm × 300 mm subjected to a prestressing of 1200 N/mm². The prestressing cable is located at the centroid and consists of 4 cables each-having 7 numbers of 5 mm diameter wires. Take m = 6.

12. (a) A rectangular concrete beam 300 mm wide, 600 mm deep is prestressed with 24 numbers of 7 mm diameter wires, having zero eccentricity at supports and 150 mm eccentricity at mid span. The profile of the tendons is parabolic. The effective prestressing force is 1500 MPa. The beam has to support a live load of 18 kN/m. The beam is simply supported with a span of 12 m. Find stress distribution at support and at mid span.

Or

(b) List out the various methods of post tensioning systems and explain any three methods with neat sketch.

13. (a) Design a prestressed concrete post tensioned beam to carry a load of 20 kN/m for a span 15 m. Adopt Magnel's graphical method.

Or

(b) Determine the short term deflection of a simply supported prestressed concrete beam of section 300 mm × 550 mm (effective)

Span of the beam = 10 m

Prestressing force = 800 kN

Live load on the beam = 20 kN/m

Profile of the cable : curved profile with 100 mm eccentricity below CGC at mid span and 30 mm eccentricity above CGC at supports.

14. (a) Explain the various steps involved in the design of a continuous prestressed concrete beam with neat sketches.

Or

(b) A composite 'T' beam made up of a pre tensioned rib 300 mm wide and 1000 mm deep and a cast in situ slab is 28 kN/mm². The differential shrinkage and creep is 0.0001.Determine the stresses caused by this on the precast and cast in situ Concrete.

15. (a) Design a PSC compression member for the following forces :

Effective height = 3.5 m

Fact. Bending moment = 50 kNm

Fact. Axial load = 300 kN.

Or

(b) Explain the principle and methods of partial prestressing.

PART C — (1 × 15 = 15 marks)

16. (a) A two span continuous beam ABC (AB = BC = 20 m) having the section 400 mm × 800 mm. The beam is prestressed by a parabolic cable concentric at supports and having an eccentricity of 150 mm at midspans. Take prestressing force as 500 kN. Check the concordancy of the cable profile.

Or

(b) The end block of a post tensions prestressed concrete beam, 300 mm wide and 300 mm deep is subjects to a concrete anchorage force of 850 kN by a Freyssinet anchorage area of 1200 mm². Design and detail the anchorage reinforcement for the end block. Take σ_y = 25 N/mm².