PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Winter 2019 - 20 Examination

Semester: 3   Date: 26/11/2019
Subject Code: 203209230   Time: 10.30 am To 1.00 pm
Subject Name: Design of Prestressed Concrete Structures   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.
5. Use of 1343 is permitted.

Q.1	A) **Define:**- **1.** Tendon, **2.** Anchorage, **3.** Pretensioning, **4.** Post tensioning and **5.** Cap cable	**(05)**
	B) A concrete beam of size 100 x 300 mm is prestressed by 5 wires of 7 mm diameter located at an eccentricity of 50mm, the initial stress in the wires being 1200 MPa. Use E_s = 210 kN/mm^2, E_c = 35 kN/mm^2, A = 30000 mm^2. Strain in concrete = 41x 10^{-6} mm/mm per N/mm^2. Estimate the loss of stress in steel due to creep of concrete.	**(05)**
	C) Write short note on concordant cable profile.	**(05)**
Q.2	**Answer the following questions. (Attempt any three) (Each five mark)**	**(15)**
	A) Enlist the design steps of pretensioned beams.	
	B) State the steps of determination of flexural strength of composite sections.	
	C) Describe the design steps of section under compression and bending.	
	C) Explain the design procedure of continuous prestressed concrete beam.	
Q.3	A) Explain the concept of load balancing in prestressed concrete.	**(07)**
	B) A concrete beam of size 200 x 300 mm is prestressed by 15 wires 5 mm diameter located 6.5 cm from the bottom of the beam and 3 wires of diameter of 5 mm, 2.5 cm from top. Calculate the stresses at the extreme fibres of the mid span section when the beam is supporting its own weight over a span of 6 m. Adopt prestress in the steel is 840 MPa. If a UDL live load of 6 kN/m is imposed, evaluate the maximum working stress in concrete.	**(08)**

<div align="center">OR</div>

	B) Explain the design procedure of prestressed section subjected to shear and torsion.	**(08)**
Q.4	A) Explain the loss due to relaxation of stress in steel and loss of stress due to friction.	**(07)**

<div align="center">OR</div>

	A) A concrete beam of size 250 x 300 mm deep is prestressed by prestressing force of 540 kN at a constant eccentricity of 60 mm. The beam is subjected to point load of 68 kN at centre of span. Determine the location of the pressure line at the centre and at supports. Neglect the self weight of beam.	**(07)**
	B) Two simply supported beam, AB = BC = 10 m, of rectangular cross section of 200 x 600 mm deep, each post tensioned by means of two parabolic cables where P = 300 kN each, with zero eccentricity at support and 150 mm at the mid span are converted in to a continuous beam by tensioning a parabolic cap cable carrying a force of 300 kN. The ends of the cap cables are located at 3 m from the central support. The cable centre is 50 mm from the top of the beam over central support B. Calculate secondary moment induced at B. Also locate the resultant line of thrust through the beam AB.	**(08)**