

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Prestressed Concrete
Program: M. Tech. (Structural Engineering)
Course Code: CIVL 7018

Semester: II
Time 03 hrs.
Max. Marks: 100

Instructions: Attempt all Questions. Assume and state clearly any data considered necessary, but not given.

SECTION A

S. No.		Marks	CO
Q 1	Which method of prestressing has more losses - in post tensioning method or pretensioning method. Explain why.	4	CO1
Q 2	Why is nominal non prestressed reinforcement is provided in prestressed concrete beams.	4	CO2
Q 3	A two span continuous beam is to be prestressed. Suggest a concordant profile for the cable and show in a diagram the details of how it should be provided.	4	CO3
Q 4	What is the role of prestress in compression members. Explain through a figure.	4	CO4
Q 5	For prestressing large diameter circular water tanks, buttresses are provided. Explain through figure how these are provided, and what is their role.	4	CO5

SECTION B

Q 6	A post tensioned prestressed concrete beam of size 700x250mm is to be provided in the hall of a multistoreyed building. The beam is simply supported over a span of 12m. It is cast, cured and prestressed initially with a force of 1200kN at an eccentricity of 250 mm, and lifted to site much later. calculate: <ol style="list-style-type: none">1. Initial stresses in concrete at extreme fibres after prestressing.2. Stresses after losses of 15% have taken place3. Stresses on lifting the beam and placing at site.4. Stresses after a live load of 15kN/m is applied on the beam.	10	CO1
Q 7	A prestressed concrete beam of size 400x800mm is concentrically prestressed with an effective prestressing force of 1400KN. Determine the bursting force in the end block in horizontal and vertical direction and design reinforcement for the end block using 16mm diameter steel bars . Sketch reinforcement details. Assume anchor plate of size 200x200mm and losses as 15%. [$P_b = P_i (0.32 - 0.3(d/2)/(D/2))$]	10	CO2
Q8	A simply supported pre stressed beam for a footbridge of 16m span is made up of a prestressed web of size 300x800m. The beam carries a live load of 20KN/m run.	10	CO3

	<p>Determine the pre stressing force and the profile of the cable such that Live load is fully balanced.</p> <p style="text-align: center;"><u>Or</u></p> <p>Explain the concept of load balancing. How can the stresses in the extreme fibres of a simply supported beam carrying a live load ‘w’ be calculated using the concept of load balancing.</p>		
Q 9	<p>A water storage tank of diameter 20m and wall thickness 100 mm and depth 5m is used for treatment of water in a city water supply scheme. If 10 mm prestressing wires having UTS of 1800 MPa are available design the tank using concrete grade M40 . Assume 20% losses. Sketch how prestressing wires can be provided in the tank.</p>	10	CO5
SECTION-C			
Q 10	<p>A prestressed column provided in a multistoreyed building is 4m long and has a cross section of 400x400mm . It is provided with concentric prestressing made up with four number HTS wires of 8mm diameter having UTS of 1400 MPa. The column carries an axial load of 600 KN. Determine the extreme stresses in the column cross section:</p> <p style="margin-left: 40px;">a. for minimum eccentricity as prescribed in IS code. b. If the column goes out of plumb by 100mm.</p> <p>If the column is made up using M40 concrete, check if the column is safe.</p>	20	CO4
Q 11	<p>A clarifier tank of diameter 25m and wall thickness 100 mm and depth 8m is used for treatment of water in a city water supply scheme. If 10 mm prestressing wires having UTS of 1600 MPa are available, design the tank using concrete grade M40 . Assume 20% losses. Sketch how prestressing wires can be provided in the tank for bottom 5m.</p> <p style="text-align: center;"><u>or</u></p> <p>Explain through figure, in the case of large diameter prestressed water tanks, why the pressure line does not coincide with the c.g. line of prestressing steel. Also explain the methodology followed to design prestressed water tanks.</p>	20	CO5