

ANURAG Engineering College
(An Autonomous Institution)

III B.Tech II Semester Supplementary Examinations, December-2024

PRE-STRESSED CONCRETE
(CIVIL ENGINEERING)

Time: 3 Hours

Max. Marks: 75

Section – A (Short Answer type questions)**(25 Marks)****Answer All Questions**

	Course Outcome	B.T Level	Marks
1. Write the basic concept of prestressed concrete.	CO1	L1	2M
2. Explain about the post tensioning system.	CO1	L2	3M
3. Give the expression for loss due to elastic deformation of concrete.	CO2	L1	2M
4. List out the losses of Pre-stressing due to pre-tensioning system.	CO2	L2	3M
5. Define kern line of section in PSC.	CO3	L1	2M
6. Define concentric tendons with sketches.	CO3	L1	3M
7. Define Anchorage zone stresses.	CO4	L1	2M
8. What is the stress distribution in double end block analysis by Magnel	CO4	L2	3M
9. Define propped section of composite pre-stressed concrete beams.	CO5	L1	2M
10. Write down the short notes on short term deflection.	CO5	L2	3M

Section B (Essay Questions)**Answer all questions, each question carries equal marks.****(5 X 10M = 50M)**

11. A) Elaborate, why the high strength concrete and high strength steel is used in Prestressed concrete structures.	CO1	L3	10M
OR			
B) Explain in detail about various principal used in PSC.	CO1	L2	10M
12. A) A rectangular concrete beam 370 mm X 250 mm is prestressed by means of 15 numbers of 5 mm diameter wires located 65 mm from the bottom of the beam and 3 numbers of 5mm diameter wires located 25 mm from the top of the beam. If the wires are initially tensioned to a stress of 820 N/mm ² . Calculate the %loss of stress in steel immediately after transfer allowing for the loss of stress due to elastic deformation of concrete only. $E_s = 210 \text{ kN/mm}^2$, $E_c = 31.5 \text{ kN/mm}^2$.	CO2	L3	10M
OR			
B) Explain the system of prestressing of Freyssinet system.	CO2	L2	10M
13. A) Explain with neat sketches of elastic design of PSC slab?	CO3	L2	10M
OR			
B) A prestressed girder of rectangular section 250 mm wide by 400 mm deep is to be designed to support an ultimate shear force of 150 kN. The uniform prestress across the section is 5 N / mm ² . Given the characteristic cube strength of concrete as 40 N / mm ² and Fe-415 HYSD bars of 8 mm diameter, design suitable spacing for the stirrups conforming to the Indian standard code IS:1343 recommendations. Assume cover to the reinforcement as 50 mm.	CO3	L3	10M
14. A) Explain in detail about PSC in Stress distribution in end block analysis with neat sketches?	CO4	L2	10M

OR

- B) The end block of post tensioned beam is 450mm x 550mm. Four cables, each made up of 8 wires of 12mm diameter strands and carrying a force of 1250 kN are anchored by plate anchorages, 150mm x 150mm located with their centers at 125mm from the edges of the end block. The cable duct is of 50mm diameter. The cube strength of concrete at transfer is 35N/mm². Check for bearing stress as per IS 1343 provision. Design suitable anchorage for the end block. CO4 L3 10M
15. A) Explain with neat sketches of differential in shrinkage in PSC composite members as per IS. CO5 L2 10M
- OR**
- B) A postal tensioned beam (bonded) 300mm X 600mm has a prestress of 1560 kN in tendons immediately which eventually reduces to 1330 kN due to losses. The beam is simply supported over a span of 12m and carries concentrated loads of 44.5 kN each at a distance of 4.5 m from supports. The tendon is parabolic with zero eccentricity at support and 120mm below centroidal axis at midspan. Calculate deflection at midspan due to,
- i) Prestress + self-weight
- ii) Prestress + self-weight + live load $E_c=35 \text{ kN /mm}^2$ CO5 L3 10M