

**ANURAG Engineering College**

(An Autonomous Institution)

III B. Tech II Semester Supplementary Examinations, Dec-2023/Jan-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
CO1	L1	2M
CO1	L2	3M
CO2	L1	2M
CO2	L1	3M
CO3	L1	2M
CO3	L1	3M
CO4	L2	2M
CO4	L2	3M
CO5	L1	2M
CO5	L2	3M

- Which type of prestressing system is used for prestressed concrete pavements? Why?
- Differentiate between pre-tension and post tensioned systems.
- Define anchorage slip of PSC
- List out the losses of Pre-stressing due to post-tensioning system.
- Define eccentric tendons with sketches.
- Define shear resistance cracks.
- What is anchorage zone stress in post tensioned members?
- What is the stress distribution in end block analysis by Guyon
- Define unpropped section of composite pre-stressed concrete beams.
- Write down the short notes on prediction of long-term deflection.

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

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|-----------|---|-----|-------|-----|
| 11.A)     | Explain in detail about the various classification of prestressing systems  | CO1 | L2    | 10M |
| <b>OR</b> |   |     |       |     |
| B)        | Explain in detail about the advantages and limitation of Prestressed concrete system.   | 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 5 mm diameter wires located 25 mm from the top of the beam. If the wires are initially tensioned to a stress of 720 N/mm <sup>2</sup> . Calculate the %loss of stress in steel immediately after transfer allowing for the loss of stress due to elastic deformation of concrete only. $E_s = 210 \text{ kN/mm}^2$ , $E_c = 43 \text{ kN/mm}^2$ . | CO2 | L3    | 10M |
| <b>OR</b> |   |     |       |     |
| B)        | List the various factors influencing loss of pre-stress in pre-tensioned and post-tensioned PSC beam.   | CO2 | L1&L2 | 10M |
| 13.A)     | Explain with neat sketches different types of cable and cable profile of PSC?   | CO3 | L3    | 10M |
| <b>OR</b> |   |     |       |     |
| B)        | A prestressed girder of rectangular section 150 mm wide by 300 mm deep is to be designed to support an ultimate shear force of 130 kN. The uniform prestress across the section is 5 N / mm <sup>2</sup> . Given the characteristic cube strength of concrete as 40 N / mm <sup>2</sup> 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 the analysis of anchorage zone stress in post tensioned members. 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 1150 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 25N/mm<sup>2</sup>. Check for bearing stress as per IS 1343 provision. Design suitable anchorage for the end block. CO4 L3 10M
- 15.A) What are propped and unpropped composite members with neat sketches? CO5 L2 10M
- OR**
- B) A PSC beam of rectangular section 120mm wide and 300mm deep spans over 6m. The beam is prestressed by straight cable carrying an effective force of 180kN at an eccentricity of 50mm. If it supports an imposed load of 4kN/m and modulus of concrete is 38 kN/mm<sup>2</sup> Compute the deflection at the following stages and check whether they comply with the IS Code specification Take density of concrete 25kN/m<sup>3</sup>.
- i) Upward deflection under (Prestress + Self weight)
  - ii) Final downward deflection under (Prestress + selfweight + imposed load) including the effects of creep and shrinkage assuming coefficient as 1.8 and loss of prestress=20%.
- CO5 L3 10M