Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **17CE3004** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PRESTRESSED CONCRETE STRUCTURES** | **Max. marks :** | **100** |

**(IS 1343:2012 and IS456:2000 are permitted)**

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Differentiate between pretensioned and post tensioned concrete. | CO1 | 5 |
| b. | Derive the expressions for determining of moment of resistance of an I beam showing the different cases with necessary stress and strain diagrams. | CO3 | 15 |
| (OR) | | | | |
| 2. | a. | List out the different types of prestressing. | CO1 | 5 |
| b. | A post tensioned concrete beam 100 mm wide and 300 mm deep, spanning over 10m is stressed by successively tensioning and anchoring of three cables 1,2 and 3, respectively. The cross sectional area of each cable is 200 mm2 and initial stress in the cable is 1200 N/mm2, αc = 6. The first cable is parabolic with an eccentricity of 50 mm below the centroidal axis at the centre of span and 50 mm above the centroidal axis at the support section. The second cable is parabolic with zero eccentricity at the support and eccentricity of 50 mm at the centre of the span. The third cable is straight with a uniform eccentricity of 50 mm below the centroidal axis. Estimate the percentage loss of stress in each of the cables, if they are successively tensioned and anchored. | CO5 | 15 |
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| 3. | a. | Can you list out the methods by which anchorage zone can be designed in prestressed concrete structure. | CO3 | 5 |
|  | b. | Check the deflection of a prestressed concrete beam of span 15m subjected to a Live load of 20 kN/m at transfer stage and under service load conditions. The initial pre-stressing force acting on the beam is 1803324.62 N with an eccentricity of 281.70 mm. Self-weight due to dead load  Moment of inertia,  Bending moment, Grade of concrete,. | CO4 | 15 |
| (OR) | | | | |
| 4. | a. | Can you narrate how the cables are positioned in a Prestressed concrete beam? | CO3 | 5 |
|  | b. | Design a composite T beam for a span of 10m with a beam spacing of 1.5m c/c. The expected loss of prestress is 20%. The live load on the beam is 35kN/m. The grade of concrete adopted is M45 and HTS wires of 5mm diameter are used. | CO5 | 15 |
| 5. | a. | Discuss how the vertical and horizontal spacing of group of cables are provided during the making of a post tensioned prestressed concrete girder? | CO5 | 5 |
|  | b. | Can you check whether a continuous prestressed concrete beam of uniform section has a cable profile as shown in Fig.1 is concordant. The magnitude of the prestressing force is 1200kN. Locate the line of pressure (C-line) in the concrete due to prestress alone not considering the dead load of the beam. | CO4 | 15 |
|  |  | | | |
| (OR) | | | | |
| 6. | a. | How would you use the kern lines for locating the position of prestressed concrete cables? | CO3 | 5 |
|  | b. | Brief the step by step procedure of drawing the layout of cables in a prestressed concrete girder. | CO3 | 15 |
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| 7. | a. | Enumerate the precautions and recommendations for effective grouting in Post Tensioned beams to ensure a durable structure. | CO6 | 5 |
|  | b. | Can you narrate the design procedure of a one way prestressed concrete slab with necessary diagrams? | CO5 | 15 |
| (OR) | | | | |
| 8. | a. | List the different types of prestressed concrete sleepers and their applications. | CO1 | 5 |
|  | b. | How would you design a two way Post-tensioned prestressed concrete slab. | CO5 | 15 |
|  | | **Compulsory:** |  |  |
| 9. |  | Design a post tensioned beam of 15m for a live load of 15kN per metre run. Adopt concrete grade of M40 and 7mm diameter steel wires of characteristic strength 1600MPa. Design the beam as type 1 structure. Assume that the strength of concrete at transfer is 35MPa and the wires can be initially stretched to 1200MPa. | CO5 | 20 |

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