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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

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

**End Semester Examination – Nov/Dec - 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **14CE202** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **Prestressed concrete structures** | **Max. marks :** | **100** |

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| **PART-A(10X1=10 MARKS)** | | |
| 1. | In prestressed concrete members, the steel is under \_\_\_\_\_\_\_\_\_\_\_ | (1) |
| 2. | The grade of concrete for prestressed members should be in the range of \_\_\_\_\_\_\_\_\_\_ | (1) |
| 3. | The partial safety factor for dead and live load at the limit state of collapse is \_\_\_\_\_\_\_\_ | (1) |
| 4. | According to IS1343 code, for Type I Prestressed concrete structures \_\_\_\_\_\_\_\_\_\_\_\_ | (1) |
| 5. | Maximum permissible final deflection of a beam should not exceed \_\_\_\_\_\_\_\_\_\_\_ | (1) |
| 6. | The simplest method of analysis of bursting tension in anchorage zone is \_\_\_\_\_\_\_\_\_\_ | (1) |
| 7. | Prestressing a continuous concrete beam results in \_\_\_\_\_\_\_\_\_\_\_ | (1) |
| 8. | Composite construction using prestressed concrete and cast in-situ concrete is adopted in \_\_\_\_\_ | (1) |
| 9. | Most widely used cross section of a prestressed concrete pole is \_\_\_\_\_\_\_\_\_\_\_ | (1) |
| 10. | Circular prestressing of concrete tanks induces \_\_\_\_\_\_\_ | (1) |
| **PART B(5 X 3= 15 MARKS)** | | |
| 11. | List the various types of loss of prestress in pretensioned and post tensioned members. | (3) |
| 12. | Write the various factors influencing the deflections of prestressed concrete beams? | (3) |
| 13. | Draw the transmission of forces in end block of post tensioned members. | (3) |
| 14. | Define primary moment develop in continuous prestressed concrete members. | (3) |
| 15. | Name the different shapes of prestressed concrete poles used in construction. | (3) |
| **PART C(5 X 15= 75 MARKS)** | | |
| 16. | A rectangular Concrete beam 100mm wide by 250mm deep spanning over 8m is prestressed by straight cable carrying prestressing force of 250kN located at an eccentricity of 40mm. Live load 1.2kN/m. Calculate the resultant stress distribution for the centre of span C/S and also find the magnitude of prestressing force with an eccentricity of 40mm. | (15) |
| (OR) | | |
| 17. | A rectangular concrete beam 360mm deep and 200mm wide is prestressed by means of 15 no, 5mm dia wires located 65mm from the bottom of the beam and 3 no of 5mm wires located 25mm from the top of the beam. If the wires are initially tensioned to a stress of 840N/mm2 . Calculate the percentage loss of stress in steel immediately after transfer, allowing for the loss of stress due to elastic deformation of concrete. | (15) |
| 18. | A pretensioned beam of rectangular section 300mm wide by 700mm deep is stressed by 800mm2 of high tensile steel located at effective depth of 600mm. The beam is also reinforced with supplementary reinforcements consisting of four bars of 25mm dia Fe415 steel, located 100mm from the soffit. Estimate the flexural strength of section. Assume ultimate tensile strength of tendons 1600N/mm2 and cube strength of concrete 40N/mm2. | (15) |
| (OR) | | |
| 19. | A perstressed girder of rectangular section 150mm wide by 300mm deep is to be designed to support an ultimate shear force of 130kN. The uniform prestress across the section is 5N/mm2. M40 grade concrete and Fe415 steel of 8mm dia used, design suitable spacing for the stirrups confirming to IS1343 recommendations. | (15) |
| 20. | The end block of a prestressed concrete girder is 200mm wide and 300mm deep. The beam is post tensioned by two freyssinet anchorages each of 100mm diameter with their centres located at 75mm from the top and bottom of the beam. The force transmitted by each anchorage being 2000kN. Compute the bursting force and design suitable reinforcement according to the IS1343 code provisions. | (15) |
| (OR) | | |
| 21. | A concrete beam with a symmetrical I section has flange width and depth of 200mm and 60mm respectively. The thickness of the web is 80mm and the overall depth is 400mm. the beam is prestressed by a cable carrying a force of 1000kN. Span of the beam is 8m. The center line of the cable is 150mm from the soffit of the beam at the centre of span, varying to 250mm at supports. Compute the initial deflection at midspan due to prestress and the soffit of the beam, Ec=38kN/mm2, Compare the deflection with the limiting deflection as per IS1343. | (15) |
| 22. | A composite beam of rectangular section is made up of a precast prestressed inverted T beam having a rib, 100mm by 780mm and a slab, 400mm wide 200mm thick. The insitu concrete has thickness of 800mm and a width of 400mm. the precast- T beam is reinforced with high tensile wires (fpu-1600N/mm2) having an area of 800mm2 and located 100mm from the soffit of the beam. Grade of concrete of cast in situ slab is M20 and prestressed beam is M40, estimate the flexural strength of composite section. | (15) |
| (OR) | | |
| 23. | A prestressed beam having a rectangular cross section with a width of 120mm and a depth of 300mm is continuous over two spans, AB=BC=8m. The cable with zero eccentricity at the ends and an eccentricity of 50mm towards the top fibers of the beam over the central support, carries an effective force of 500kN.  A) Calculate the secondary moment developed at B.  B) If the beam supports concentrated loads of 20kN each at mid points of span, evaluate the resultant stresses at the central support section B.  C) Locate also the position of the pressure line at section. | (15) |
| 24. | a) Write the advantages of using prestressed concrete poles?  b) Write short notes on partial prestressing | (15) |
| (OR) | | |
| 25. | Design a suitable section for the tie members of a prestressed concrete truss to carry a design tensile force of 600kN. Assume the permissible compressive stress in concrete at transfer as 15N/mm2 and tension is not allowed under service loads. Loss of prestress is 20%. High tensile wires of 8mm diameter with an ultimate tensile strength of 1400N/mm2 with an initial stress of 800N/mm2 are available for use. Tensile strength of concrete 3N/mm2. A load factor of 2 against collapse and 1.25 against cracking is to be ensured in the design. | (15) |

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