JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL- 2019

B.TECH 8$^{TH}$ / M.Tech II Semester

COURSE CODE: **12M1WCE231**                                    MAX. MARKS: **25**

COURSE NAME: **Prestressed Concrete Design**

COURSE CREDITS: **3**                                    MAX. TIME: **1.5 Hrs**

___

*Note:* *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume any suitable data if needed.*

___

**Q1.** Deduce an equation to find the loss of prestress due to tensioning process in a prestressed concrete beam.                                    **[5, CO3]**

**Q2.** A prestressed concrete beam of rectangular cross section 250mm wide and 350mm deep is provided with 12 high tensions wires of 6mm diameter located from the bottom of the beam and 4 similar 6mm wires at the top located at 40mm from the top of the beam. The wires are initially stretched at a stress of 900N/mm$^2$. Determine the percentage loss of stress in the steel wire due to elastic shortening of concrete. Take $E_s$= 2.1×10$^5$ N/mm$^2$ and $E_c$= 3.5× 10$^4$ N/mm$^2$.   **[5, CO2-CO3]**

**Q3.** A post tensioned concrete beam of symmetrical section is 10mm deep and has a sectional area of 2.5×10$^5$ mm$^2$. The effective span of the beam is 20mm while its actual length is 20.60mm. The prestressing force is provided by 5 cables each consisting of 12 wires of 5mm diameters. The cables are provided following a parabolic profile so that the center of gravity of the cables may be taken to be 200mm above the lower edge of the beam at the center and 600mm above the lower edge of the beam at the ends. The initial prestress after overcoming the losses due to friction and anchorage slip is 1000 N/mm$^2$. Determine                                    **[7, CO2-CO3]**

i) The actual jacking stress required

ii) The effective prestress after all losses have occurred

μ= 0.30, K= 0.0015/m, anchorage slip= 2.55mm, shrinkage strain= 250×10$^{-6}$, creep strain= 35×10$^{-6}$ mm/mm per N/mm$^2$, relaxation of steel stress = 4%, $E_s$= 2.1×10$^5$ N/mm$^2$ $E_c$= 3 × 10$^4$ N/mm$^2$.

**Q4.** A prestressed concrete beam of rectangular section is 125mm wide and 350mm deep. The beam is prestressed with a cable provided along the longitudinal centroidal axis. The effective prestressing force is 180kN. The beam carries a UDL of 2.25kN/m including the weight of the beam. Locate the pressure line for the beam at every 1m from either end. The beam has a span of 8m.                                    **[5, CO2]**

**Q5.** How there is loss of Prestress due to creep of concrete? Explain                                    **[3, CO3]**