Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –Ist SEMESTER–EXAMINATION – JULY- 2012

Subject code: 712007N **Date: 11/07/2012**

Subject Name: Pre stressed concrete

Time: 2:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of IS:1343 is permitted**

Q.1 **(a)** Narrate the advantages of Prestressed concrete & Explain the need of high strength materials in Prestressed concrete. **07**

(b) A rectangular concrete beam of cross-section 350mm deep & 210mm wide is prestressed by means of 20 wires of 5mm diameter located 70mm from the bottom of the beam. Assuming the prestress in the steel as 850N/mm^2, calculate the stresses at the extreme fibres & draw the stress distribution diagram of the mid-span section when the beam is supporting its own weight & a udl Live load of 5kN/m over a span of 6m. **07**

Q.2 **(a)** Explain factors influencing the deflection of Prestressed concrete members in detail. **07**

(b) A rectangular concrete beam of cross section 200mm wide and 300mm deep is simply supported over a span of 6.5m and is prestressed by means of a symmetrical parabolic cable, at a distance of 75mm from the bottom of the beam at mid span and zero at the support sections. If the force in the cable is 400kN and the modulus of elasticity of concrete is 38kN/m^2, calculate the deflection at mid-span when the beam is supporting its own weight & the concentrated load which must be applied at mid-span to restore it to the level of supports. **07**

OR

(b) Explain different types of losses encountered in the pre-tensioning &pos-tensioning systems. **07**

Q.3 **(a)** A rectangular concrete beam of cross-section 225mm wide and 350mm deep is prestressed by a straight cable carrying an effective force of 200kN at an eccentricity of 75mm. The beam supports an imposed load of 3kN/m over the entire span of 5m. If the modulus of rupture of concrete is 4.5N/mm^2, evaluate the cracking moment for the beam assume self weight of beam as 25kN/m^3. **07**

(b) Explain steps for design of prestressed sections for tension as per IS:1343. **07**

OR

Q.3 **(a)** Explain the methods of prestressing. **07**

(b) A post tensioned cable of a beam 8m long is initially tensioned to a stress of 1000N/mm^2 at one end. If the tendons are curved so that the slope is 1 in 20 at each end, with an area of 650mm^2, calculate the loss of prestress due to friction, if the coefficient of friction between duct and cable=0.55 & coefficient for 'wave' effect=0.0015 per m. During anchoring, if there is slip of 2.5mm at the jacking end, calculate the final force in the cable and the percentage loss of prestress due to friction and slip. Es=210kN/mm^2. **07**

Q.4 **(a)** A pre-tensioned beam, 100mm wide and 150mm deep, is to be designed to support working load of 4kN/m over the entire span of 4m. If the permissible stresses in tension are zero at transfer and 1.4 N/mm^2 under working loads, find out the number of 4mm wires and the corresponding eccentricity required at the mid-span section. Permissible tensile stress in wires is $1200N/mm^2$. The loss of prestress is 20% and the density of concrete is $25kN/m^3$. **07**

(b) Explain the following terms: Cap cable, Transfer of prestress, Transmission length, creep in concrete & Anchorage. **07**

OR

Q.4 **(a)** Explain methods of achieving continuity in case of continuous beams. **07**

(b) Narrate advantages & disadvantages of continuous prestressed concrete members. **07**

Q.5 **(a)** Explain the effect of shear & bond in the prestressed concrete members. Also explain design for shear & bond as per code. **07**

(b) A pretensioned, prestressed concrete beam having a rectangular section 200mm wide and 350mm deep, has an effective cover of 40mm. If fck=$40N/mm^2$, fp=$1600N/mm^2$, and the area of prestressing steel Ap=$460mm^2$, calculate the ultimate flexural strength of the section using IS:1343 code provisions. **07**

OR

Q.5 **(a)** Explain stresses due to differential shrinkage in composite members using precast prestressed units & in-situ cast concrete. **07**

(b) Explain partial prestressing and its advantages. **07**

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