

FACULTY OF ENGINEERING

B.E. 4/4 (Civil) I - Semester (Suppl.) Examination, May / June 2017

**Subject : Pre-Stressed Concrete
(Elective – I)**

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

- 1 Distinguish between shrinkage and creep of concrete.
- 2 How do you compute the loss of pre stress due to wobble effect.
- 3 What is load balancing concept.
- 4 What is Thermo Elastic prestressing.
- 5 List out the different losses which occur in the pre-tensioned and post tensioned members.
- 6 Explain the term minimum pre stressing force.
- 7 Explain concentric and eccentric tendons.
- 8 What is an end block
- 9 Explain the importance of end block.
- 10 What do you mean by concordant cable profile ?

PART – B (50 Marks)

11. What are the assumptions made in pre stressed concrete. Discuss in detail different pre-tensioning and post-tensioning methods and advantages of each method with neat sketches.
12. A post tensioned concrete beam 200 mm wide and 400mm deep is pre-stressed by four cables each with a cross-sectional area of 80mm^2 with an initial stress of 1200N/mm^2 . All the four cables are straight and located at 120mm from the soft it of the beam. If the modular ratio is 6 calculate the loss of pre-stress in the four cables due to elastic deformation of concrete for only of the following cases :
 - a) Simultaneous tensioning and anchoring of cables.
 - b) Successive tensioning of four cables one at a time.
13. A concrete beam 100mm wide and 300mm deep is pre-stressed by a parabolic cable carrying an effective stress of 120Mpa. The beam is simply supported over an effective span of 8m. the cable compound by 6 wires of 7 mm diameter, has an eccentricity of 75mm at the centre and zero at the supports. Assume $E_c=35\text{Gpa}$. Neglecting all losses find central deflection of beam under :
 - a) Self weight + pre-stress.
 - b) Self weight + pre-stres + LL of 20KN/m throughout.

14. What are the advantages of end-blocks ? Explain in detail step wise procedure for Guyon's design methods ?
15. A post-tensioned cable of a beam 10m long is initially tensioned to a stress of 1000 N/mm^2 at one end. If the tendons are curved so that the slope is 1 in 15 at each end with an area of 600 mm^2 , calculate the loss of pre-stress due to friction given the following data :

Coefficient of friction between duct and cable = 0.55

Friction coefficient for wave effect = 0.0015/m

During anchoring, if there is a slip of 3mm at jacking end, calculate the final force in the cable and percentage loss of pre-stress due to friction and Slip.

16. A PSC T-beam has a flange 1000mm wide and 200mm thick. The web is 200 mm thick and 1000 mm deep. At a particular section the beam is subjected to an ultimate moment and shear force of 2000 KN-m and 250KN respectively. Calculate the flexure shear resistance and design suitable shear reinforcement at the section using the following data :

Effective depth = 1100 mm

Cube strength of concrete = 40 MPa

Effective pre-stress at the extreme tensile face of beam = 19.3 N/mm^2 .

Second moment of area of cross section = $7.533 \times 10^{10} \text{ mm}^4$

Area of pre-stressing steel = 2310 mm^2

Tensile strength of tendons = 1500 N/mm^2

Effective stress in tendons after all losses = 900 N/mm^2

17. Write short notes on the following :

- a) Cracked and un-cracked sections.
- b) Design of continuous beams according to IS specifications.
