22508

23124

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) State any four structural components for which precast elements can be used.

(b) Define modulus and modular co-ordination.

(c) State any four precast structural building components.

(d) Define pre-tensioning and post-tensioning in case of pre-stressed concrete.

(e) What is basic principle of pre-stressed concrete ?

(f) List any four losses in post-tensioned pre-stressed concrete.

(g) State any four assumptions in analysis of pre-stressed concrete beams.

2. Attempt any THREE of the following : **12**

(a) State any four advantages and four disadvantages of precast concrete.

(b) Describe any two design considerations for precast tunnel lining.

(c) Describe any two tests on precast components as per Indian Standard.

(d) Describe with sketch any two joints for precast elements of door and window frames.

3. Attempt any THREE of the following : **12**

(a) Explain any one method of prefab system.

(b) Explain the procedure of manufacturing load bearing precast wall panels with neat sketch.

(c) State the advantages and disadvantages of pre-stressed concrete.

(d) State the situations in which wire, cable and tendon are used with justification.

4. Attempt any THREE of the following : **12**

(a) Calculate the number of precast slab panels using specification for components as per IS:15916-2010 for room size 3 m × 4 m.

(b) Differentiate between losses in prestress due to shrinkage and creep of concrete with any two points and state two remedial measures to avoid them.

(c) Illustrate cable profiles for eccentric straight and parabolic cables with sketches.

(d) Explain the effect of concentric and eccentric straight cables on pretresses at mid span and at support with formulae.

(e) A pre-tensioned beam of overall size 300 mm × 600 mm has a prestress of 1500 kN. The beam carries a udl of 6 kN/m over entire span. Compute the fiber stresses at mid span if eccentricity = 150 mm.

5. Attempt any TWO of the following : **12**

(a) Explain the procedure of the storage, transportation and erection of pre-fabricated building elements.

(b) Explain Hoyer system of pre-stressing with respect to process and applications with sketch.

(c) Explain Freyssinet system of pre-stressing with respect to process and application with sketches.

6. Attempt any TWO of the following : **12**

(a) A pre-tensioned concrete beam 150 mm wide and 300 mm deep is pre-stressed by straight wires carrying an initial force of 150 kN at an eccentricity of 50 mm. Calculate the percentage loss of prestress due to elastic deformation of concrete. Take area of wire = 188 mm^2, Es = 210 GPa and Ec = 35 GPa.

(b) A concrete beam is post-tensioned by a cable carrying an initial stress of 1200 N/mm^2. The slip at Jacking end was observed to be 5 mm. The modulus of elasticity of steel is 210 kN/mm^2. Estimate percentage loss of stress due to anchorage slip if the length of beam is (i) 25 m, (ii) 5 m.

(c) A rectangular concrete beam of size 200 mm × 300 mm deep is pre-stressed by means of 15 wires of 5 mm diameter located at 65 mm from the bottom of the beam and 3 wires of 5 mm diameter, 25 mm from the top. Calculate the stresses at the extreme fibres of the mid span section if pre-stressing is 840 MPa and live load is 8 kN/m.

Take span = 6 m and density of concrete = 24 kN/m^3 sketch the stress distribution.