22508

21222

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

15 minutes extra for each hour

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

(2) Answer each next main Question on a new page.

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

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

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

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

(8) Use of steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Attempt any FIVE of the following : **5 × 2 = 10**

(a) State any two advantages of precast concrete member.

(b) State any four precast structural building components that are used for prefabricated buildings.

(c) State any two methods of coring for prefabricated components.

(d) State any two advantages of prestressed concrete.

(e) Define pre-tensioning & post-tensioning for prestress concrete.

(f) State the meaning of loss of pre-stress.

(g) State any two basic assumptions in analysis of prestressed concrete beam.

2. Attempt any THREE of the following : 3 × 4 = 12

(a) State any four non-structural precast elements and explain in brief any one.

(b) State any four structural precast elements and explain in brief sheet pile.

(c) Explain aerated and foam concrete.

(d) Explain in brief determination of water absorption of paver block and state its permissible limit.

3. Attempt any THREE of the following : 3 × 4 = 12

(a) State the various elements for a prefabricated building and draw neat sketch of any one.

(b) Differentiate between mixed and composite construction with any four points.

(c) Differentiate between prestressed concrete (PSC) and reinforced concrete (RCC) (any four points).

(d) Describe the applications of prestressed concrete.

4. Attempt any THREE of the following : 3 × 4 = 12

(a) Describe the procedure of the storage transportation of precast elements.

(b) Explain the loss of pre-stress during tensioning process.

(c) Explain in brief cable profile in simply supported rectangular beam section.

(d) Describe the simple steps involved in design of prestress simply supported rectangular beam.

(e) Explain the effect of cable profile on maximum stresses at midspan and at support.

5. Attempt any TWO of the following : 2 × 6 = 12

(a) Depict the effect of prefabricated building on surrounding environment with respect to noise pollution, stacking of elements and transportation.

(b) State the methods of prestressing and illustrate the merits and demerits of pre-stressing methods.

(c) Explain Hoyer system of pre-tensioning with diagram.

6. Attempt any TWO of the following : **2 × 6 = 12**

(a) A pre-tensioned concrete beam, 100 mm wide and 300 mm deep, is prestressed by straight wires carrying an initial force of 150 KN at an eccentricity of 50 mm. The modulus of elasticity of steel and concrete are 210 GPa and 35 GPa respectively. Calculate the percentage, loss of stress in steel due to elastic deformation of concrete if the area of steel wire is 188 mm^2.

(b) A concrete beam is pre-stressed by a cable carrying an initial pre-stressing force of 300 kN. The cross-sectional area of the wires in the cable is 300 mm^2. Calculate the percentage of loss of stress in the cable only due to shrinkage of concrete using IS.I343 recommendation assuming the beam to be

(i) pre-tensioned

(ii) post tensioned

Assume E_S = 210 kN/mm^2 and age of concrete at transfer = 8 days.

(c) A rectangular concrete beam of cross-section 300 mm deep and 200 mm wide 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 diameter of 5 mm, 25 mm from the top. Assuming the pre-stress in the steel as 840 N/mm^2, calculate the stresses at the extreme fibres of the mid span section when beam is supporting its own weight over a span of 6m. If a uniformly distributed live load of 6 kN is imposed, evaluate the maximum stress in concrete. The density of concrete is 24 kN/m^3. Draw the stress distribution diag.