

22508

23242

3 Hours / 70 Marks

Seat No.

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- 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.

Marks

1. Attempt any FIVE of the following :

5 × 2 = 10

- (a) Define Pre-stress.
- (b) State any two name of material used in precast concrete.
- (c) Define modules & modular coordination.
- (d) Define Pre-stress concrete & state type of pre-stressing steel.
- (e) State two necessary requirements of high grade material for pre-stressed concrete.
- (f) Define Tendon and Anchorage.
- (g) List various types of losses in pre-stressing.

2. Attempt any THREE of the following :

3 × 4 = 12

- (a) State the limitation of Pre-stressing.
- (b) Describe any two design considerations for precast box culvert element.



- (c) State the method of pre-stressing. Explain any one method in detail.
- (d) State the different losses in pre-stress. Explain losses due to shrinkage of concrete.

3. Attempt any THREE of the following :

3 × 4 = 12

- (a) List material used in pre-stressed concrete. Explain their properties.
- (b) Differentiate between mixed and composite construction with four points.
- (c) Explain the assumption made in the analysis of pre-stressed concrete beam.
- (d) State the situation in which paver block, fencing poles, transmission poles & manhole cover are used with justification.

4. Attempt any THREE of the following :

3 × 4 = 12

- (a) Differentiate between losses in elastic shortening and creep in steel with any two points and state two remedial measures to avoid them.
- (b) Explain the effect of concentric and eccentric straight cables on stresses of mid span.
- (c) Calculate the number of precast slab panels and number of beam using specification for component as per [IS 15916 - 2010] for room size 4 m × 5 m.
- (d) Illustrate cable profile for eccentric straight and parabolic cables with sketches.
- (e) A beam of span 20 m is to be pre-stressed. Suggest the suitable cable profile with reason.

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

- (a) Explain simple steps involved in design of simply supported rectangular beam.
- (b) Explain Hoyer system of pre-stressing with respect to process and application & sketch.
- (c) For what types of structure do you recommend pre tensioning ? Justify.

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

- (a) A beam is past tensioned by a cable carrying an initial stress of 1300 N/mm^2 . The slip at jacking end was observed to be 7 mm. The modulus of elasticity is 210 kN/mm^2 . Estimate the percentage loss of stress due to anchorage slip if the length of a beam is (1) 20 m (2) 6 m.
 - (b) Explain Magnel Blaton system of pre-stressing with respect to process application, merits with sketch.
 - (c) A rectangular concrete beam of size $230 \times 300 \text{ mm}$ deep is pre-stressed by means of 15 wires of $6 \text{ mm } \phi$ located at 75 mm from bottom of beam. Calculate stress at the extreme fibres of the mid span section if pre-stressing is 800 mpa and live load is 5 kN/m. Take span 6 m & density of concrete 24 kN/m^3 . Sketch the stress distribution diagram.
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