

22508

22232

3 Hours / 70 Marks

Seat No.

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- 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 four materials used for precast concrete elements.
- (b) State any four precast structural building components.
- (c) Define modules and modular co-ordination.
- (d) State any four losses of pre-stress in pre-tensioning method.
- (e) Define pre-tensioning and post-tensioning in case of pre-stressed concrete.



22508

[2 of 4]

- (f) State four necessary requirements of high grade materials for pre-stressed concrete.
- (g) Sketch the profiles for eccentric straight and parabolic cables.

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

- (a) State any four advantages and four disadvantages of precast concrete.
- (b) State any four structural precast elements and recommend these where used.
- (c) Describe and two design considerations for Tunnel lining elements.
- (d) State two requirements of structural joints and their two design considerations.

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

- (a) Explain the procedure of the storage, transportation and erection and pre-fabricated building elements.
- (b) Explain the procedure of manufacturing of non-load bearing precast wall panels with neat sketch.
- (c) State basic principles of pre-stressed concrete.
- (d) State the two advantages and two disadvantages of pre-stressed concrete.

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

- (a) Explain in brief the effect of prefabricated building on surrounding environment of the given building. [Ecological Aspect]
- (b) State the I.S. recommendations of percentage losses in pre-tensioning and post tensioning methods.
- (c) State any four assumptions in analysis of pre-stressed concrete beam.

22508

[3 of 4]

- (d) A pre-tensioned beam of overall size 300 mm × 600 mm has a pre-stressed force of 1500 kN. The beam carries a udl of 6 kN/m over entire span. Calculate the fibre stresses at mid span if eccentricity = 150 mm.
- (e) Explain the effect of eccentric straight and parabolic cables on stresses at mid span and at support with formula.

5. Attempt any TWO of the following :

2 × 6 = 12

- (a) Define mixed and composite construction and differentiate between mixed and composite construction with four points.
- (b) Explain Freyssinet system of pre-stressing with respect to process and application with sketches.
- (c) Explain Hoyer system of pre-stressing with respect to process and application with sketches.

6. Attempt any TWO of the following :

2 × 6 = 12

- (a) A post-tensioned beam of span 10 m and cross section 200 mm × 300 mm is pre-stressed with a straight cable of area 320 mm² located at a constant eccentricity of 50 mm. The initial stress in the cable is 1000 in mpa. Calculate the loss due to creep of concrete if creep coefficient is 1.6 $E_s = 210$ Pka. $E_C = 35$ KPa.
 - (b) A pre-tensioned concrete beam 100 mm wide and 300 mm deep is pre-stressed by straight wire carrying an initial force of 150 kN at an eccentricity of 50 mm. Calculate the percentage loss of pre-stress due to elastic deformation of concrete. Take area of wire = 188 mm², $E_s = 210$ GPa $E_c = 35$ GPa.
 - (c) Explain the steps adopted in the design of pre-stressed beam element.
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