

**Precast and Prestressed Concrete Structures (315317)**

MSBTE Diploma · K-Scheme · Model Question Paper — Set A

**Time: 3 Hours****Max. Marks: 70****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. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

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

- a) Define precast concrete. Give any two examples of precast elements.
- b) Define module and modular co-ordination.
- c) State the basic principle of prestressed concrete.
- d) Define: i) Pre-tensioning ii) Post-tensioning.
- e) State the meaning of loss of prestress. Name any two losses.
- f) State any four basic assumptions made in the analysis of prestressed concrete beams.
- g) Define Autoclaved Aerated Concrete (AAC) and state its use.

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

- a) State the necessity of precast concrete in present-day construction. (Any four points)
- b) Describe with neat sketches the following precast elements: i) Fencing pole ii) Paver block.
- c) Describe the key features of a precast RCC box culvert with a neat sketch.
- d) State the materials required for precast concrete construction along with their use. (Any four)

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

- a) Explain the storage and transportation of precast elements with a neat sketch.
- b) State any four requirements of structural joints in prefabricated buildings.
- c) Differentiate between pre-tensioning and post-tensioning. (Any four points)
- d) State any four applications of prestressed concrete.

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

- a) Explain the Hoyer system of pre-tensioning with a labelled sketch.

- b) Draw the cable profiles in a simply supported rectangular beam for: i) Concentric ii) Eccentric straight iii) Parabolic tendon.
- c) Explain the loss of prestress due to elastic deformation of concrete in pre-tensioned and post-tensioned members.
- d) A simply supported rectangular beam  $250 \text{ mm} \times 500 \text{ mm}$  of span  $6 \text{ m}$  is prestressed by a concentric cable carrying a force of  $600 \text{ kN}$ . It carries a live load of  $12 \text{ kN/m}$ . Taking unit weight of concrete as  $25 \text{ kN/m}^3$ , find the extreme fibre stresses at mid-span and draw the stress distribution diagram.
- e) Justify the need of high-strength concrete and high-tensile steel in prestressed concrete.

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

**12**

- a) Explain the term 'prefabricated building construction' and describe its process with a flow chart.
- b) Explain the Freyssinet system of post-tensioning with respect to components, process and application. Draw neat sketches.
- c) List the equipment required for the construction of prefabricated buildings with application of each. (Minimum six)

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

**12**

- a) A pre-tensioned beam  $250 \text{ mm} \times 400 \text{ mm}$  is prestressed by wires of total area  $350 \text{ mm}^2$  at an eccentricity of  $60 \text{ mm}$ , with initial stress  $1120 \text{ N/mm}^2$  (ultimate strength of wire  $1600 \text{ N/mm}^2$ ).  $E_s = 210 \text{ kN/mm}^2$ ,  $E_c = 35 \text{ kN/mm}^2$ , creep coefficient =  $1.6$ . Using IS 1343 values for shrinkage and relaxation, calculate the total percentage loss of prestress. Neglect self weight.
- b) Elaborate the IS 1343 recommendations for losses of prestress and state the typical % losses in pre-tensioning and post-tensioning.
- c) Explain the effect of cable profile on the maximum stresses at mid-span and at the supports of a simply supported beam.

**Note:** This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — [anandatechnologies.in](http://anandatechnologies.in)