

Precast and Prestressed Concrete Structures (315317)

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

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) State any four non-structural precast concrete elements.
- b) Define: i) Self-compacting concrete ii) Foam concrete.
- c) Define modular co-ordination and state any two of its advantages.
- d) State the principle of prestressing with a simple sketch.
- e) State any two advantages and two disadvantages of prestressed concrete.
- f) State the minimum grade of concrete recommended by IS 1343 for pre-tensioned and post-tensioned members.
- g) State any four assumptions made in the analysis of a prestressed concrete beam.

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

- a) Describe the importance of precast concrete for mass housing and infrastructure works.
- b) Describe with sketches any four precast building components.
- c) Explain non-structural precast elements used for tunnels, canals and bridges with sketches.
- d) Explain the fabrication (casting) process of precast elements in a casting yard.

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

- a) Calculate the number of precast slab panels for a room of clear size $3.6 \text{ m} \times 4.8 \text{ m}$ using 600 mm wide modular panels (bearing 100 mm on each wall, thickness 120 mm). Find the size and weight of one panel and draw the layout.
- b) Write the functions, applications, advantages and disadvantages of load-bearing and non-load-bearing precast wall panels.
- c) Explain the following terms: i) Tendon ii) Anchorage iii) Transfer iv) Effective prestress.

- d) Explain the procedure of storage, transportation and erection of a precast building element.

Q.4 Attempt any THREE of the following:

12

- a) Differentiate between internal and external prestressing.
- b) State the IS recommendations for % losses in case of pre-tensioning and post-tensioning.
- c) Explain the loss of prestress due to friction and due to anchorage slip in post-tensioned members.
- d) A beam $200 \text{ mm} \times 450 \text{ mm}$, simply supported over 8 m , has a parabolic cable ($e = 125 \text{ mm}$ at mid-span, zero at supports) with effective force 500 kN . Imposed load $= 10 \text{ kN/m}$, unit weight of concrete $= 25 \text{ kN/m}^3$. Find the extreme fibre stresses at mid-span and at the support.
- e) Compare pre-tensioning and post-tensioning with respect to merits, demerits and applications.

Q.5 Attempt any TWO of the following:

12

- a) Describe the Hoyer system of pre-tensioning with a neat diagram. State its merits and applications.
- b) State with justification the situations in which Freyssinet, Magnel-Blaton and Gifford-Udall systems are applied.
- c) List the equipment used for handling and erection of prefabricated elements and describe the erection of a precast wall panel with a sketch.

Q.6 Attempt any TWO of the following:

12

- a) A post-tensioned beam $300 \text{ mm} \times 600 \text{ mm}$ has 4 straight cables of 200 mm^2 each at $e = 150 \text{ mm}$, tensioned one after another to 1120 N/mm^2 ($f_{pu} = 1600 \text{ N/mm}^2$) at 28 days. $E_s = 210 \text{ kN/mm}^2$, $E_c = 35 \text{ kN/mm}^2$, creep coefficient $= 1.6$. Using IS 1343 values, find the total % loss of prestress (neglect friction and slip).
- b) Draw the cable profiles (concentric, eccentric straight and parabolic) in a simply supported rectangular beam and explain the effect of each on the stresses at mid-span and at supports.
- c) Explain the various losses of prestress with a classification chart, stating which losses occur in pre-tensioning and which in post-tensioning.

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