Precast and Prestressed Concrete Structures (315317)

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

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) Enlist any four structural precast concrete elements.

b) List any four types of concrete used for precast elements.

c) Define module. State the value of the basic module.

d) Define prestressed concrete and state the types of prestressing steel.

e) State any two basic assumptions made in the analysis of a prestressed concrete beam.

f) Sketch the eccentric straight and parabolic cable profiles for a simply supported beam.

g) List any four types of losses of prestress.

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

a) State any two advantages and two disadvantages of precast concrete.

b) Draw typical cross-sections of precast door frame and window frame showing reinforcement.

c) Describe the following precast elements: i) Manhole cover ii) Precast mesh.

d) What are the important tests to check the quality of precast elements? Explain the load test in detail.

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

a) Describe the requirements of structural joints with sketch of any one joint between prefabricated elements.

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

c) Differentiate between prestressed concrete and reinforced concrete. (Any four points)

d) State the situations in which wire, strand, cable and bar tendons are used, with justification.

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

a) Describe the different loading stages of a prestressed concrete member.

b) Explain the Gifford-Udall system of post-tensioning with a sketch and state its merits and demerits.

c) A post-tensioned cable 20 m long has a parabolic profile with a central dip of 400 mm and is tensioned from one end to a stress of 1200 N/mm². Coefficient of friction μ = 0.35, wobble coefficient k = 0.0015 per m. The anchorage slip is 5 mm and Es = 200 kN/mm². Calculate the loss of stress due to friction at the far end and due to anchorage slip.

d) A simply supported beam carries a concentrated load at the centre of the span. Suggest a suitable cable profile with justification.

e) Describe the long-line (Hoyer) method of pre-tensioning with a neat labelled sketch.

Q.5 Attempt any TWO of the following: **12**

a) Explain the procedure of storage, transportation and erection of precast wall panels and slab panels.

b) Explain the Magnel-Blaton system of post-tensioning with neat sketches and state its application.

c) What types of prestressing steel are used in prestressed concrete? Describe any two in detail.

Q.6 Attempt any TWO of the following: **12**

a) A prestressed concrete beam 300 mm × 600 mm, simply supported over 9 m, has a straight cable with eccentricity 120 mm below the centroid. The prestressing force at transfer is 900 kN and the losses are 15 %. The beam carries a live load of 12 kN/m. Taking unit weight of concrete 25 kN/m³, find the extreme fibre stresses at mid-span (i) at transfer and (ii) at service. Draw stress distribution diagrams.

b) Describe the loss of prestress due to (i) creep of concrete (ii) shrinkage of concrete (iii) relaxation of steel, stating IS 1343 values.

c) Describe with neat sketches the straight (concentric and eccentric) and parabolic tendon profiles in a simply supported rectangular 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