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Register No. :

Name of the Candidate:

POST DIPLOMA / DIPLOMA EXAMINATION, 2010

(CONCRETE TECHNOLOGY AND DESIGN OF CONCRETE STRUCTURE)

(PAPER – IV)

540. PRE STRESSED CONCRETE

December) (*Time: 3 Hours*

Maximum: 100 Marks

Answer ONE full question from each unit ***(5×20=100)***

All questions carry equal marks

Use of IS1343 and IS3370 are permitted. Assume suitable data wherever necessary.

UNIT- I

1. a) Explain why high tension steel and high strength concrete are used for prestressed concrete.
   b) What are the various types of prestressing? State their important features.

(OR)

2. a) Describe the methods of prestressing with suitable sketches.
   b) Describe the various losses in prestressing. Indicate their order of magnitude.

UNIT- II

3. A PSC beam of rectangular cross section 400mm wide and 900mm deep is used as a simple beam. Obtain the prestress and eccentricity at midspan : 8 M_D = 180 kNm and M_L = 225 KNm. Use concrete sections in calculations. Assume f_{cci} = 12.5 N/mm^2, fccf = 11 N/mm^2 and fcfi = fcff = 1 N/mm^2 and loss ratio α = 0.8.

(OR)

4. a) Explain the different ways of imposing shear resistance of a concrete beam using pretensioning technique.
   b) Explain the Hoyer effect in the phenomenon of bond in a pretensioned beam.
   c) Discuss the nature of anchorage zool stresses with particular eeterona to bursing and spacing tension.

UNIT- III

5. A post tensioned unbounded beam of rectangular section has 500mmwidth and 800mm effective depth. It is post tested with 64 numbers of 8mm diameter high tension steel in 4 cables. The cables are unbonded. The steel is stressed to a level of 800 N/mm^2 after all losses. The ultimate tensile strength of steel is 1400 N/mm^2. Assuming a concrete strength of 40 N/mm^2. Evaluate the moment of resistance of the beam as per IS specifications. The span length of the beam is 18 m.

(OR)

6. a) Discuss the advantages and disadvantages when partial pre stressing is done.
   b) Briefly outline the necessity of using composite section in PSC structures.
   c) Explain the terms propped construction and unpropped construction as applied to composite construction.

UNIT- IV

7. a) Design a precast pre tensioned column to carry an axial load of 200 w and a bending moment of 15m. Effective length of column is 4m. Loss is 20%. M40 concrete is to be used.
   b) What are the advantages of PSC poles?

(OR)

8. A continuous PSC beam ABC (AB = BC = 10m) has a uniform rectangular cross section with a width of 100mm and depth of 300mm. The cable, carrying an effective prestressing force of 360 KN is parallel to the axis of the beam and located at 100mm from the soffit. Determine the secondary and resultant moment at the central support B. If the beam supports an imposed load of 1.5 kN/m. Calculate the resultant stresses at top and bottom of the beam at B. Also locate the resultant line of thrust through the beam ABC.

UNIT- V

9. A cylindrical PSC water tank of internal diameter 30m is required to store water over a depth of 7.5m. The permissible compressive stress in concrete of transfer is 13 N/m^2 and the minimum compressive stress under working pressure is 1 N/mm^2. The loss ratio is 0.75 wires of 5mm diameter with an initial stress of 1000 N/mm^2 are available for circumferential winding and everysinet cables made up of 12 wires of 8mm diameter stressed to 1200 N/mm^2 are to be used for vertical prestressing. Design the tank walls assuming the base and fixed. The cable strength of concrete is 40 N/mm^2.

(OR)

10. a) Explain the terms: Cylinder pipes and non-cylinder pipes.
    b) What are the advantages of PSC pipes?

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