(DCE 416 A)

B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Final Year)

CIVIL ENGINEERING

Paper - VI : Pre stressed Concrete

Time : 3 Hours **Maximum Marks : 75**

Answer question No.1 compulsory ***(15 × 1 = 15)***

Answer ONE question from each unit ***(4 × 15 = 60)***

1) a) What is the basic principle of pre stressed concrete?

b) What are the losses in pre stressed concrete?

c) What is an anchor?

d) What is the necessity of using high strength concrete and high tensile steel in pre stressed concrete?

e) Define creep.

f) What is 'load balancing concept'?

g) Give formula for loss due to creep in creep coefficient method.

h) What is the condition for pressure line for load balancing?

i) What is 'de-bonding'?

j) What is meant by 'limiting zone'?

k) What is 'transmission length'?

l) What is an end block?

m) What is a 'tendon'?

n) What is "Effective Reinforcement Ratio"?

o) State any two important factors influencing deflections.

UNIT – I

2) a) What are the advantages of pre stressed concrete over reinforced concrete? **(5)**

b) Describe in detail any one method of post tensioning. **(5)**

c) Explain the assumptions in the analysis of pre stressed concrete. **(5)**

OR

3) A pre stressed concrete beam 250 mm wide and 360 mm deep has a span of 12 m. The beam is pre stressed by steel wires of area 350 mm^2 provided at a uniform eccentricity of 60 mm with an initial pre stress of 1250 N/mm^2. Determine the % of stress in the wires if the beam is (a) pre-tensioned (b) post - tensioned. **(15)**

1. Parameter	2. Pre-tensioned	3. Post-tensioned
4. E_S	11. 210 kN/mm^2	17. 210 kN/mm^2
5. E_C	12. 35 kN/mm^2	18. 35 kN/mm^2
6. Ultimate creep strain	13. 45×10^{-6}	19. 22×10^{-6}
7. Shrinkage	14. 300×10^{-6}	20. 215×10^{-6}
8. Relaxation	15. 5%	21. 5%
9. Anchorage slip	16. --	22. 1.25
10.		

UNIT - II

4) A Post-tensioned girder of 20 m span has a symmetrical I-section with the following details :

Flanges : 750 mm × 200 mm

Web : 300 mm × 800 mm

It has a parabolic cable line with eccentricities equal to 500 mm, -200 mm and -200 mm at mid span and at the two ends. At the initial stage, the pre stressing force is 3,780 kN and the dead load is 17.08 kN/m inclusive of self weight. At the final stage, the pre stressing force reduces to 3,240

kN and the total load is 50.16 kN/m. Determine the extreme fibre stresses at mid span section at the initial and final stages. **(15)**

OR

5) A rectangular concrete beam 150 mm × 400 mm is simply supported over a span of 8 m and is pre stressed by a symmetrical parabolic cable with an eccentricity of 100 mm at mid span. If the pre stressing force is 350 kN and f_{ck} = 40 N/mm^2, Calculate :

a) Deflection at mid span due to pre stress and self weight and

b) The concentrated load that is required to restore it to the level of supports. **(8 + 7 = 15)**

UNIT - III

6) a) What are the service ability limit states? Discuss briefly the IS : 1343 code recommendations regarding service ability limit states. **(8)**

b) What are the preliminary design considerations to be considered in case of elastic design of pre stressed concrete sections for flexure. **(7)**

OR

7) A pre stressed concrete T-beam is to be designed to support an imposed load of 4.4 kN/m over a span of 5 m. The T-beam is made up of flange of size 400 mm × 40 mm. The rib is 100 mm wide and 200 mm deep. If the allowable stress is limited to 15 MPa and 0.75 MPa in compression and tension respectively, determine the required pre stressing force and its eccentricity at mid span section. **(15)**

UNIT - IV

8) Explain in detail :

a) Guyon's Method **(8)**

b) Magnel's Method **(7)**

OR

9) Design the shear reinforcement for a pre stressed concrete beam of size 440 mm × 1300 mm carrying a pre stressing force of 3300 kN located at an eccentricity of 360 mm. The area of pre stressing steel is 3000 mm^2. The grade of concrete is M 35 and the characteristic strength of the pre stressing steel is 2000 MPa and effective pre stress is 1100 MPa. Ultimate shear force over the section considered is 650 kN and the ultimate bending moment is 950 kNm. **(15)**

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