Total No. of Questions – [06] Total No. of Printed Pages: 02

G.R. No.	

PAPER CODE	P-122-213 DSE/ESE

May 2022 / INSEM+ENDSEM

F. Y. M. TECH. (Civil-Structures) (SEMESTER – II)

COURSE NAME: Design of Prestressed Concrete Structures

COURSE CODE: CVPB12203

(PATTERN 2020)

Time: [3 Hours] [Max. Marks: 60]

(*) Instructions to candidates:

1) **All Questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed.**
4) **Use suitable data where ever required.**
5) **Use of IS: 1343-2012 is allowed.**

Q.1) (a) A PSC beam of cross sectional dimensions 300mm x 650mm is prestressed with cable of area 300mm2 located at constant eccentricity of 100mm.Initial stress in the cable is 1100N/mm^2. The span of the beam is 11m. Estimate the percentage loss of stress in the cables if the beam is (a) pre-tensioned and (b) post-tensioned. Use the following data: (1) E_s=210GPa (2) E_c=35 GPa (3) Anchorage slip = 1mm (4) Friction coefficient = 0.0015 per m (5) Creep strain = 40 x 10^{-6} mm/mm per N/mm^2 for pre-tensioned member and 20 x 10^{-6} mm/mm per N/mm^2 for post-tensioned member (6) Shrinkage strain in concrete = 300 x 10^{-6} for pre-tensioned member and 200 x 10^{-6} for post-tensioned member (7) Relaxation of stress in steel = 2%. **(10 Marks)**

Q.2) (a) Explain any two basic concepts of prestressing **(4 Marks)**

(b) A rectangular section 300mm x 600mm is pretensioned with 965mm^2 of steel wires with initial prestress of 1050 MPa. The cg of the wires is located at 100mm above the soffit of the beam. Assume f_{pu} =1500MPa and f_{ck} = 40MPa. Calculate flexural strength of the beam. **(6 Marks)**

Q.3) (a) State any four factors influencing deflections in prestressed concrete members. **(2 Marks)**

(b) A prestressed concrete beam of rectangular section 125mm wide and 250mm deep has a span of 6m. The beam is provided with a straight tendon at a uniform eccentricity of 40mm, the corresponding force being 190kN. Check the beam for deflection. Consider live load of 3.75kN/m, coefficient Φ= 1.75 including the effect of creep and shrinkage of concrete. Ec= **(8 Marks)**

38kN/mm^2.

Q.4) (a) The end of a post tensioned PSC beam 200mm wide and 300mm deep is subjected to a concentric force of 1000kN by Freyssinet anchorage of area 1200mm^2. Design and detail the end block reinforcement. **(6 Marks)**

(b) Explain the IS code provisions for design of prestressed concrete beam for shear. **(4 Marks)**

Q.5) Design a post tensioned one way simply supported slab of span 10m. Total superimposed load is 25kN/m^2. Allowable stresses in concrete are 15N/mm^2 and zero in compression and tension respectively. Assume force in each cable 500kN and loss ratio 0.80. **(10 Marks)**

Q.6) (a) State any four NDT equipments used in inspection of PSC members and their specific use. **(4 Marks)**

(b) Explain in detail any two methods of strengthening of PSC members. **(6 Marks)**