Code No: **RT41012** **R13** **Set No. 1**

IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017

PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Where do you adopt circular prestressing? [3]
   b) Explain the terms dead load stress and live load stress. [4]
   c) List out the various types of loss of prestress in pre tensioned members. [4]
   d) What type of stress blocks are adopted in Indian code specifications of flexural strength computations? [4]
   e) Distinguish between web shear cracks and flexural shear cracks. [3]
   f) Explain the term busting tension with reference to post tensioned pre stressed members. [4]

PART–B *(3x16 = 48 Marks)*

2. a) What are the applications of prestressed concrete? [8]
   b) What is the necessity of using high strength concrete and high tensile steel in prestressed concrete? [8]

3. a) Write about Freyssinet system of post tensioning. [10]
   b) What is a pressure line ?Explain its significance with sketches. [6]

4. List out the various types of losses in pre tensioning and post tensioning. [16]

5. a) Discuss the various methods of predicting long-term deflections of uncracked prestressed concrete members. [10]
   b) A pretensioned prestressed concrete beam having a rectangular section 150mm wide and 350mm deep has an effective cover of 50mm.If f_{ck} =40N/mm^2,f_p = 1600 N/mm^2 and the area of prestressing steel A_s = 461 mm^2,calculate the ultimate flexural strength of the section using IS:1343 code provision. [6]

6. What are the codal provisions for design of shear and torsion? [16]

7. Discuss the analysis of stresses at anchorage by Magnel's method. [16]

Code No: **RT41012** **R13** **Set No. 2**

IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017

PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B

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PART–A *(22 Marks)*

1. a) What is the necessity of using untensioned reinforcement in pre stressed concrete members? [3]
   b) List out the various types of tensioning devices used in pre stressed concrete. [3]
   c) What is relaxation of stress in steel? [4]
   d) What are the assumptions of strain compatibility method? [4]
   e) What are the various modes of failures in pre stressed concrete beams due to shear and torsion? [4]
   f) What are the various methods used for investigating anchorage zone stresses? [4]

PART–B *(3x16 = 48 Marks)*

2. a) Distinguish between the terms stress relaxation, stress corrosion and hydrogen embrittlement. [8]
   b) What are the advantages of prestressed concrete? [8]

3. a) Explain with sketches Hoyer's long line system of pre tensioning. [8]
   b) What are the basic assumptions in prestress concrete? [8]

4. a) A prestressed concrete beam 500mm x 500mm, is prestressed by 12 wires, each of 8mm diameter. The wires are initially stressed to 1600N/mm^{2}with their centriods located 80mm from the soffit. Calculate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using given the following data
   E_S =210kN/mm^2 and E_c = 32kN/mm^2,
   Creep co-efficient =1.6 , Residual shear strain = 3 x 10^{-4}
   Relaxation of steel stress = 90N/mm^2. [12]
   b) Derive the loss due to elastic shortening of concrete. [4]

5. a) The horizontal prestress at the centriod of a concrete beam of rectangular cross section 340mm by 600mm, is 10N/mm^2 and maximum shearing force on the beam is 90kN.Calculate the maximum principal tensile stress [8]
   b) Explain the various modes of failure encountered in prestressed concrete beams subjected to bending moment, shear and torsion. [8]

6. Explain the term End blocks. Write the steps involved in the design of end blocks by Magnel's method. [16]

7. Derive the equation of short term deflections of uncracked members by Mohr's theorems. [16]

Code No: **RT41012** **R13** **Set No. 3**

IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017

PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B

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PART–A *(22 Marks)*

1. a) Distinguish between Uniaxial, Biaxial and Triaxial pre stressing. [4]
   b) Explain the principle of post tensioning. [3]
   c) List out the various types of loss of prestress in post tensioned members. [3]
   d) What are the different types of flexural failure modes? [4]
   e) List some practical examples of structures subjected to combined bending. [4]
   f) Explain the terms End block and Anchorage zone. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Distinguish between creep and shrinkage of concrete. [8]
   b) What are the necessary cover requirements for prestressed concrete? [8]

3. a) Explain with sketches any one system of post tensioning. [8]
   b) A pre-stress concrete rectangular beam of size 500 mm x 750 mm has a simple span of 7.3 m and is loaded with a udl of 45 kN/m including its self-weight. An effective pre-stress of 1620 kN is produced. Compute the fiber stresses in concrete at mid-span section. [8]

4. a) Derive the loss due to creep of concrete. [6]
   b) A pre tensioned beam 400 mm wide and 600 mm deep is pre stressed by 10 wires each of 10 mm diameter initially stressed to 1000 N/mm^2 with their centroids located 100 mm from the soffit. Estimate the final percentage loss of stress due to elastic deformation, creep, shrinkage and relaxation using the following data:
   Relaxation of steel stress = 90 N/mm^2
   Es =210 kN/mm^2, E_C = 35 kN/mm^2
   Creep coefficient = 1.5
   Residual shrinkage strain = 2 x 10^{-4} [10]

5. a) Explain with sketches the IS CODE method of computing the moment of resistance of rectangular sections. [8]
   b) What are the different ways of improving the shear resistance of structural concrete members by prestressing techniques? [8]

6. a) Derive the equation of short term deflections of uncracked members by Mohr's theorems. [8]
   b) What are the codal recommendations regarding the design of reinforcements in prestressed sections subjected to moment shear and torsion? [8]

7. a) Define End block. What is bursting force and end zone reinforcement? [10]
   b) Draw the stress distribution in end block. [6]

Code No: **RT41012** **R13** **Set No. 4**

IV B.Tech I Semester Regular/Supplementary Examinations, October/November - 2017

PRESTRESSED CONCRETE

(Civil Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B

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PART–A *(22 Marks)*

1. a) What is the basic principle of pre stressed concrete? [3]
   b) Distinguish between concentric and eccentric tendons. [4]
   c) What is the loss of stress due to anchorage slip? [4]
   d) What is effective reinforcement ratio? [3]
   e) Sketch the types of shear cracks in structural concrete members. [4]
   f) What is transmission length? [4]

PART–B *(3x16 = 48 Marks)*

2. a) What is the difference between pre tensioning and post tensioning? [8]
   b) What are the applications of pre stressed concrete? [8]

3. a) What are the different types stresses in tendons? [10]
   b) Enumerate load balancing concept. [6]

4. a) Write about short term deflections and long term deflections. [8]
   b) A pre stressed concrete beam of rectangular section 300mm wide by 600mm deep, spans over 12m.The beam is pre stressed by a straight cable carrying an effective force of 550kN at an eccentricity of 80mm. The modulus of elasticity of concrete is 50kN/m^2. Compute the deflection at centre of span under prestress and self-weight. [8]

5. a) Define bonded and unbonded pre stressing concrete. [8]
   b) "Post-tensioned members do not suffer the loss of prestress due to elastic deformation " why? [8]

6. Explain with sketches the effect of varying the ratio of depth anchorage to the depth of end block on the distribution of bursting tension. [16]

7. a) What are the types of shear cracks? [8]
   b) What are the recommendations as per IS code? [8]