1 (a) Briefly outline the advantages of using high strength concrete & high strength steel in

(b) Define the following terms:

(i) Externally prestressed members.
(ii) Internally prestressed members
(iii) Circular prestressing.

(c) Explain in detail Gifford Udall system of post tensioning with the help of neat sketch.

2 (a) Explain Pretensioning and Post tensioning of concrete members. What are the advantages of prestressed concrete members over reinforced concrete members?

(b) Explain Gifford Udall system of Post tensioning with the help of neat sketch.

3 (a) What is the need for using high tension steel instead of mild steel in PSC.

(b) Why do you go for high grade concrete instead of ordinary concrete in PSC.

4 (a) Explain the Magnel Blaton system of prestressing with the help of a neat sketch.

(b) Discuss the various losses that take place in post tensioned members.

5 (a) Explain with sketches Hoyer systems of pre tensioning.

(b) What are supple monetary anchoring devices?

6 (a) Differentiate between pretensioning and post tensioning systems? How is prestress Transmitted to the concrete in

(i) pretensional members and (ii) post tensioned members

(b) What are the general principals of prestressing? What are the advantages of using high

7 Write short note on

(a) Prestressed concrete versus Reinforced concrete.
(b) Merits and demerits of Prestressed Concrete.
(c) Pre-tensioning versus post tensioning.
(d) Advantages of High strength concrete in prestressing concrete

8 Write short note on

(a) Freyssinet system
(b) P.S.C Mono wire system.
(c) Lee-McCall system.

9 a) What is the minimum concrete strength requirements prescribed for prestressed concrete Members in IS: 1343 code?

(b) What are post-tensioning anchorages?

(c) Where do you adopt circular prestressing?

10 (a) What are the principles of prestressing in pretensioning and post tensioning?

(b) What are the various states of loading stages to be considered in the design of prestressed concrete structures?

11 A straight post tensioned concrete member 18 meters long with a cross section of 425 x 425 mm2 is prestressed with 920 mm2 of steel wires. This steel is made up of four tendons. With 230 mm2 per tendon. The tendons are tensioned to a stress of 1025 N/mm2. Determine the loss of prestress in each tendon due to elastic shortening of concrete. Find also the average percentage loss of prestress. If it is desired that after the last tendon is tightened a stress of 1025 N/mm2 be maintained in each tendon. Calculate the actual stresses to which the individual tendons should be tightened. Take m = 6. [10M]

12 A concrete beam of 10 m span 100 mm wide and 300 mm deep is prestressed by 3 cables. The area of each cable is 200 mm2 and the initial stress in the cable is 1200 N/mm2. Cable 1 is parabolic with an eccentricity of 50 mm above the centroid at supports and 50 mm below at the centre of span. Cable 2 is also parabolic with zero eccentricity at supports and 50 mm below the centroid at the centre of span. Cable 3 is straight with an uniform eccentricity of 50 mm below the centroid. If the cables are tensioned from one end only, estimate the percentage loss of stress in each cable due to the effects of friction. Assume K=0.0015/M. [10M]

13 A straight post tensioned concrete member 15m long with a cross section of 400 * 400mm2 is prestressed with 900mm2 of steel wires. This steel is made of four tendons with 225 mm2 per tendon. The tendons are tensioned to a stress of 1050N/mm2. Determine the loss of prestress in each tendon due to elastic shortening of concrete. Find also the average percentage loss of prestress. If it is desired that after the last tendon is tightened, a stress of 1050 N/mm2 be maintained in each tendon, compute the actual stresses to which the individual tendons should be tightened. Take m=16. [10M]

14 A pre tensioned beam 200mm wide and 300mm deep is prestressed by 10 wires of 7mm diameter initially stressed to 1200N/mm2, with their centroid located at 100mm from the soffit. Find the maximum stress in concrete immediately after transfer, allowing only for elastic shortening of concrete. If the concrete undergoes a further shortening due to creep and shrinkage while there is relaxation of 5 percent of steel stress, estimate the final percentage loss of stress in the wires using the Indian standard code (IS: 1343-1980) regulations, and the following data: creep coefficient = 1.6; Total residual shrinkage strain = 3x10-4 [10M]

15 A prestressed concrete beam 200mm wide and 300mm deep is prestressed with wires of area 320 mm2 located at a constant eccentricity of 50 mm and carrying an initial stress of 1000 N/mm2. The span of the beam is 10m. calculate the percentage loss of stress in the wires if the beam is (a) pretensioned and (b) post tensioned, using the following data: Es =210kN/mm2 and Ec = 35 kN/mm2; relaxation of steel stress = 5 percent of the initial stress; shrinkage of concrete = 300*10-6 for pretensioning and 200*10-6 for post tensioning; creep coefficient =1.6; slip at anchorage = 1 mm; frictional coefficient for wave effect = 0.00154 per m. [10M]

16 A post-tensioned concrete beam, 100mm wide and 300mm deep, is prestressed by three cables, each with a cross-sectional area 50mm2 and with an initial stress of 1200=mm2. All the cables are straight and located 100mm from the soffit of the beam. If the modular ratio is 6, calculate the loss of stress in the three cables due to elastic deformation of concrete for the only the following cases. Simultaneous tensioning and anchoring of all three cables and successive tensioning of the three cables, one at a time. [10M]

17 A post tensioned concrete beam 200mm wide and 450mm deep, is prestressed by a circular cable (Total area = 800 mm2) with zero eccentricity at the ends and 150mm at the centre. The span of the beam is 10m. The cable is to be stressed from one end such that an initial stress of 840N/mm2 is available in the un jacked end immediately after anchoring. determines the stress in the wires at the jacking end and the percentage loss of stress due to friction. Coefficient of friction for curvature effect = 0.6 Friction coefficient for wave effect = 0.003/m [10M]

18 A post-tensioned cable of beam 10m long is initially tensioned to a stress of 1000N/mm2 at one end. If the tendons are curved so that the slope is 1 in 24 at each end, with an area of 600mm2, Calculate the loss of prestress due to friction given the following data. Coefficient of friction between duct and cable = 0.55, friction coefficient for wave effect = 0.015 per m. During anchoring, if there is a slip of 3mm at the jacking end, calculate the final force in the cable and the percentage due to friction and slip Es = 210kN/mm2. [10M]

19 A concrete beam of 10m span 100mm wide and 300mm deep is prestressed by 3 cables. The area of each cable is 200mm2 and the initial stress in the cable is 1200N/mm2. Cables 1 is parabolic with an eccentricity of 50mm above the centroid at the supports and 50mm below at the centre of span. Cable 2 is also parabolic with zero eccentricity at supports and 50mm below the centroid at the centre of span. Cable 3 is straight with uniform eccentricity of 50mm below the centroid. Is the cables are tensioned from one end only, estimate the Percentage loss of stress in each cable due to friction. Assume =0.35 and K=0.0015 per m [10M]

20 A concrete beam of 9 m span 125 mm wide and 300 mm deep is prestressed by 3 cables. The area of each cable is 200 mm2 and the initial stress in the cable is 1200 N/mm2. Cable 1 is parabolic with an eccentricity of 50 mm above the centroid at supports and 50 mm below at the centre of span. Cable 2 is also parabolic with zero eccentricity at supports and 50 mm below the centroid at the centre of span. Cable 3 is straight with an uniform eccentricity of 50 mm below the centroid. If the cables are tensioned from one end only, estimate the percentage loss of stress in each cable due to the effects of friction. Assume K=0.0015/M. [10M]

21 A prestressed concrete bridge deck comprises any unsymmetrical-I section beams spanning over 20m. The cross-section of a typical beam is shown in figure. The beam is [10M]

22 An unsymmetrical I - section beam is used to support an imposed load of 2 kN/m over a span of 8 m. The sectional details are top flange, 300 mm wide and 60 mm thick [10M]

23 A post tensioned beam of rectangular cross section, 200 mm wide and 400 mm deep, is 10m long and carries an applied load of 8 kN/m, uniformly distributed on the beam. The [10M]

24 A prestressed concrete I beam has its upper flange 750 mm wide and 200 mm deep, lower flange 400 mm wide and 300 mm deep and a web of depth 500 mm and width [10M]

25 A concrete beam of rectangular beam section, 100 mm wide and 300 mm deep, is prestressed by 3 cables each carrying an effective force of 240 kN. The span of the [10M]

26 A prestressed concrete beam 120 mm × 300 mm deep and 10 m span is prestressed by an [10M]

27 A prestressed concrete beam of section 120mm wide by 300mm deep is used over Effective span of 6m to support a U.D.L. of 4kN/m, which includes the self weight of [10M]

28 A prestressed concrete beam 150mm wide by 300mm deep, is prestressed by cable which has an eccentricity of 80 mm at centre of span section. The span of the beam is [10M]

29 A concrete beam with a cross section area of 32*103mm2 and radius of gyration of 72mm is prestressed by a parabolic cable carrying an effective stress of 1000 N/mm2 [5M]

30 A prestressed T-section has flange 1200mm wide and 150 mm thick. The width and depth of rib are 300 and 1500 mm respectively. The high tensile steel has an area of [10M]

31 A prestressed concrete beam span of 10m of rectangular section, 120mm wide and 300mm deep, is axially prestressed by a cable carrying an effective force of 180kN [10M]

32 . A cantilever portion of a prestressed concrete bridge with a rectangular cross-section, 600mm wide and 1650mm deep is 8m long and carries a reaction of 350kN from the [10M]

33 A post tensioned beam of rectangular cross section, 200 mm wide and 400 mm deep, is 10m long and carries an applied load of 8 kN/m, uniformly distributed on the beam. The [10M]

34 A prestressed concrete beam 120 mm × 300 mm deep and 10 m span is prestressed by an parabolic cable having an eccentricity of 100 mm at centre and zero at the supports [10M]

35 Explain Guyon's method of computing bursting tension in the case of end blocks subjected to Forces not evenly distributed with multiple anchorages? [10M]

36 Explain the following methods to study the stress distribution in the end block a) Magnel Method [10M]

37 A prestressed concrete beam 250mm wide and 600mm deep is subjected to an axial Prestressing force of 1500kN. Design the end block using Guyon's method. A [10M]

38 A prestressed I section has the following properties. Area=55x103mm2 [10M]

39 A prestressed concrete beam span of 8m of rectangular section, 120mm wide and 2800mm deep, is axially prestressed by a cable carrying an effective force of 220kN [10M]

40 The support section of prestressed concrete 100mm*200mm is required to support ultimate shear force of 60KN. The compressive prestress at centroidal axis 5KN/mm2 [10M]

41 A post tensioned concrete beam of rectangular section is 250mm wide and 450mm deep. The beam is prestressed by two cables of area of 510mm2 each, which are [10M]

42 A concrete beam having a rectangular section 100 mm wide and 300 mm deep is prestressed by a parabolic cable carrying an initial force of 240 kN. The cable has an [10M]

43 A prestressed concrete beam spanning over 8 m is of rectangular section, 150 mm wide and 300mm deep. The beam is prestressed by a parabolic cable having eccentricity 75 [10M]

44 A cylindrical prestressed concrete water tank of internal diameter 30 m is required to store water over a depth of 7.5 m. The permissible compressive stress in concrete at [10M]

45 A cylindrical prestressed concrete water tank of internal diameter 32 m is required to store water over a depth of 8.0 m. The permissible compressive stress in concrete at [10M]

46 A post tensioned concrete beam of rectangular section is 275 mm wide and 450 mm deep. The beam is prestressed by two cables of area 500 mm2 each, which are initially [10M]

47 A prestressed concrete beam of span 8 m has a section of area 42*103mm2 the moment of inertia of the section being 1700000mm4. The beam is prestressed with a parabolic [10M]

48 a) List the various factors influencing the deflections of prestressed concrete members. [5M]

b) Distinguish clearly between short term and long term deflection of prestressed concrete Beams [5M]

49 Concrete beam with cross sectional area 32*103mm2 and radius of gyration of 72mm is prestressed by a parabolic cable carrying an effective stress of 1000mm2, the span of [10M]

50 a) List the various factors influencing the deflection of prestressing concrete members [5M]

b) Explain with example the effect of tendon profile on deflections of prestressed concrete [5M]

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