**ST-7008 PRESTRESSED CONCRETE STRUCTURES**

**QUESTION BANK**

**TWO MARK**

1. What is the difference in load carrying mechanism between prestressed concrete and reinforced cement concrete in flexure under working condition?

2. State the difference between wobble effect and curvature effect in losses due to friction.

3.Sketch the strain and stress-force diagram at mid span section of a pretensioned flexural member with a rectangular cross section, subjected to effective prestressing force ‘ p’ at an eccentricity ‘e’ at collapse. Indicates the salient features.

4. What is hoyer’s effect , in transfer of prestress in pretensioned members?

5. What is the effect of partial wire winding in prestressed concrete water tanks?

6. What is load balancing concept?

7. Give the stress –strain diagram of Fe415 reinforcement and prestressing wire on the same figure, bringing out the nature pg the diagram and the range of their ultimate stress values.

8.what do you mean by a limit state design?

9. Sketch the permissible cable zone type II beams indicating the salient features

10. Give the line of transfer of prestressing force over an end block of a post tensioned members

11. When is prestressing advantages to columns?

12. Define prestressing .

13. Write down any two inequalities used in design of prestressed concrete beams for flexure under service load stress approach

14. Sketch the strain and stress / force diagram of a prestressed concrete beam section under collapse.

15. What are the advantages of linear transformation in continuous prestressed concrete beams

16. State any two classification of prestressed concrete beam section under flexure with respect to the magnitude of tensile stress( under service load).

17. Why high strength concrete is needed for prestressing?

18. How the losses due to elastic shorting can be adjusted for post tensioned beams

19. What is pressure line?

20. why is end blocks necessary for prestressing concrete beams?

21. What do you mean by linear transformation?

22. What do you mean by partial prestressing?

23. Why high tensile steel wires and high strength concrete are used for prestressed concrete?

24.discuss the measures to be adopted for counteracting elastic loss and friction loss in case of post tensioned members.

25. How can a prestressed concrete beam be considered to carry its own weight?

26. Draw a neat sketch of load-moment interaction diagrams and mark the salient valves

27.Out line the necessity of using composite section in prestressed concrete structures.

28.Why are non-prestressed reinforcements used in prestressed concrete ?

29. What are the advantages of prestressed concrete poles

30. Explain , how the friction loss in curved tendons could be reduced in post tensioned members.

31. Explain the term Hoyer effect on pretensioned elements

32. What are the advantages of partial prestressing?

33. What are cap cables?

34. List the different classifications of prestressing.

35. When is pre-tensioned preferred?

36. list some of the standard prestressing system

37. Distinguish between bonded and unboned tendons

38. List the various losses in prestress

39. what is anchorage zone and what is it significance

40. What are the advantages of composite construction?

41. What are the two inelastic properties of steel considered in assessing its quality? What are the codal requirements?

42.Name the various methods of pre-stressing concrete.

43.Define Kern distance.

44. Draw a sketch showing the stress distribution in end block by double anchor plate.

45. Explain conventional failure of an over reinforced pre-stressed concrete beam.

46. What is the stress induced in concrete due to circular pre-stressing?

47. Explain the effect of pre-stressing force in concrete poles.

48. What are the roles played by shear connectors in composite construction?

49. What are the forces considered in the calculation of deflection of pre-stressed concrete beams?

50. Why the deck slab of pre-stressed concrete bridges is mostly made of non-pre-stressed concrete?

51. Draw the cross sectional profile of most commonly used pre-stressed concrete beams in bridges.

52. State the reasons for which high tensile concrete is necessary in prestressed

concrete construction.

53 . List any four types of post tensioning losses.

54. What are the stages of loading to be considered in design of prestressed concrete section for flexure?.

55. What is the zone of transmission in end block of prestressed concrete structures?

56. List any two advantages in partial prestressing.

57. What are the needs of prestressing in compression members?

58. What do you by mean unpropped constructions with reference to composite prestressed concrete structures.

59. Draw any four types of composite pre-Stressed concrete sections.

**PART –B**

1. A post tensioned beam of rectangular cross section 150mmx 300mm deep is prestressed by 8,7mm wires located at 100mm form the soffit of the beam throughout. The wires are successively stressed to 1100 N/mm2. Calculate the loss in each wire, due to elastic shortening.
2. A prestressed concrete beam 200mmx300mm deep is used over an effective span of 6m to support an imposed load of 4KN/m. The beam is prestressed with an effective prestressing force of 175KN. The cable profile is parabolic with zero eccentricity at support and 100mm below the centroid at mid span. Using load balancing approach calculate the stresses in concrete mid span and at support under transfer and final conditions. Loss=20%
3. A prestressed concrete beam simply supported beam with an effective span of 10m supports a uniformly distributed live load of 12KN/m. Loss=15%. Design a rectangular section, prestressing force and eccentricity using stress range approach. Transfer or prestress is after 28 days. Adopt TYPE I member.
4. A prestressed concrete beam with rectangular section is subjected to a live load bending moment 300KNm and dead load moment of 100KNm. With no tension in concrete, design the cross section including prestressing force and eccentricity, adopting LIN’s approach. Take strength of concrete at transfer as 40N/mm2 . Loss=20%
5. A post tensioned beam has an end block of size 300mmX600mm deep. The beam is provided with two cables each cable transferring the effective prestressing force of 500KN.One cable is located at 150mm from the bottom. The transfer takes place through anchor plates of diameter 110mm each. Loss=20%. Design the end block for bearing and bursting tension. Transfer takes place after 28 days.
6. A two span continuous prestressed concrete beam ABC (AB=BC=15m) is presrtessed with a parabolic cable profile over each span with eccentricities, at supports A and C=0, at support B=100mm(above) and midspan of AB and BC= 200mm(below). Prestressing force=250KN. Check the concordancy of the cable profile and determine the reaction at support B due to prestress only. The beam has the same cross section throughout the span.
7. A composite rectangular beam consists of a prestressed inverted T section of dimension, width of bottom flange=500mm,thickness of bottom flange=250mm. Depth of web=400mm,and thickness of web=100mm. Overall dimensions of the rectangular beam is 500mmX750mm deep. The prestressed concrete portion is prestressed with an effective prestressing force of 700KN at an eccentricity of 100mm below the centroid of the presrtessed portion.Loss=20%. Dead load (DL) and live load (LL) moment in the section are 100KNm and 120KNm respectively. Calculate the maximum stresses in the insitu concrete and prestressed concrete, if prestressed concrete is made up of M40 concrete and insitu concrete is M20 concrete.
8. A cylindrical prestressed water tank has 20m internal has 20m internal diameter and 5m height. The wall is to be prestressed circumferentially with 5mm diameter wires with a transfer stress 1000N/mm2. For vertical prestressing Freyssinet cables 12 wires of 8mm dia each, stressed at transfer stress of 1200N/mm2. Design the wall of the tank. Assume flexible joint between wall and base of tank.
9. A rectangular concrete beam of cross section 200mmX400mm deep is prestressed by 12 wires of 7mm diameter 30mm from top. The effective prestress in steel is 800N/mm2. The beam has an effective span of 6 m and supports a super imposed load of 10KN/m. Locate the thrust line and hence calculate maximum stresses in concrete at midspan section at final condition.
10. A bonded prestress concrete beam with rectangular cross section of dimension 300mmX600mm deep is prestressed by high tensile steel with an area 1500mm2 at an effective cover of 100mm. The effective stress in the tendon is 800N/mm2 and characteristic strength of the tendon material is 1500N/mm2. The beam is reinforced with complementary reinforcement of 3 numbers of 20mm diameter Fe 415 bars at an effective cover of 50mm. Calculate the ultimate flexural strength of the section from first principles.
11. A PSC beam of rectangular section 100mm wide and 200mm deep is to be designed for a super imposed load of 1.5KN/m at service state, over a span of 3m.The member is to be Type I. Loss ratio=0.8. Determine the minimum prestressing force and corresponding eccentricity.
12. A simply supported PSC beam of rectangular section with an effective span 10m is to carry a central concentrated load of 75KN at service state. If the maximum permissible stresses are 14N/mm2 in compression and zero in tension and loss ratio is 0.8, design the midspan section (cross section dimension, prestressing force and its eccentricity) using stress range approach.
13. Design values of a cylindrical PSC water tank are hoop tension 720KN per meter height of the wall and a vertical moment of 70KNm per meter length along the circumference of the tank. 5mm diameter HTS wires at initial stress of 1000N/mm2 and Freyssinet cables 12 numbers of 7mm diameter stressed to 1200N/mm2 are available for circumferential and vertical stressing respectively. Design the thickness of the wall, spacing of circumferential wire winding and spacing of vertical cables. Loss ratio=0.8
14. The end block of a PSC member is 150mm wide by 300mm deep, transferring a prestressing force of 200KN through an anchor plate 100mm wide and 80mm deep at an eccentricity of 50mm. Design the end block. Transfer takes place after 28 days.
15. A rectangular composite beam (precast PSC and insitu concrete) of gross dimension 500mmX750mm deep, consists of an inverted T (PSC) with flange 500mm widthX250mm thick and web 150mm X400mm deep. M 40 concrete for precast and M 30 for insitu concrete are used. The composite section is subjected to an all inclusive total moment of 600KN.m. Prestressing force and eccentricity in precast section is 1800KN and 110mm respectively. Determine the maximum stress at the bottom fibre of the composite beam.
16. A post tensioned beam 100mm wide and 250mm deep, with an effective span 8m is stressed by successive tensioning an anchoring of three cables, 1,2 and 3 respectively. The cross sectional area of each cable is 150mm2 and transfer stress in the cable is 1000N/mm2.Modular ratio between steel and concrete is 6. Cable ‘1’ is linear with a constant eccentricity of 50mm, throughout, below the centroid of the section. Cable ‘2’and ‘3’ have polygonal profiles. Cable ‘2’ has an eccentricity zero at support and 50mm below centroid of the section, at midspan. Cable ‘3’ has an eccentricity 50mm above centroid of the section,at support and 50mm below centroid of the section, at mid span. Estimate the loss of prestress due to shortening of concrete in each cable using principles and total loss due to shortening of concrete using IS provisions if the cables are successively stressed and anchored.
17. A prestressed bonded beam has a flanged section with the top flange width 300mm, flange thickness 150mm, web width 150mm and effective depth 500mm.Concrete is M40. Effective prestress in steel is 1000N/mm2 and ultimate strength of steels is 1600N/mm2.Area of steel provided is 250mm2 and its Young’s modulus is 2X105 N/mm2. Calculate the ultimate moment capacity of the section from first principles.
18. A pretensioned beam with rectangular cross section and effective span 3m is subjected to a live load of 2.5KN/m. Concrete to be used is M40. 3mm high tensile steel wires are available for prestressing, with ultimate strength of 1500N/mm2 and a transfer prestress of 1000N/mm2. Concrete strength at transfer is 30N/mm2.Loss factor is 0.8.Design the mid span of the beam using stress range approach as type 2 member. Also sketch the permissible cable zone over span.
19. A post tensioned bonded prestressed concrete one way slab with thickness 400mm supports a live load of 30KN/m2.M30 concrete is used. Freyssinet system 12 with cables each containing of 12 numbers of 5mm diameters are to be used. Ultimate strength of cable wires is 1500N/mm2 and transfer prestress is 1000N/mm2. Member is type I. Loss factor is 0.8. determine the minimum prestressing force and the corresponding eccentricity for the slab using Magnel’s approach. Also state the significance of the eccentricity. Transfer of prestress takes place after 28 days. Effective span of the slab is 8m.what is the prestressing force required if concentric prestressing is adopted?
20. The end block of a post tensioned beam is 150mmX400mm deep.There are two cables anchored with an eccentricity of one cable being 150mm below and other 50mm above the centroid of the section. Each cable transfers a prestressing force of 100KN through a distribution plate 100mm wide and 50mm deep. Design and detail the end block for bearing and bursting tension. M40 concrete is used. Strength of concrete at transfer is 40N/mm2.Fe415 reinforcement is available.
21. A cylindrical prestressed concrete water tank has an internal diameter 25m and inner height 6m. Concrete to be used is M40. 5mm dia high tensile strength of 1500N/mm2 are available for circumferential prestressing. The wall and base slab connection shall be assumed as fixed. Design the wall in the circumferential direction only also taking into account safety against cracking and collapse. Loss ratio is 0.8.
22. A prestressed concrete compression member with a square cross section 250mmX250mm is prestressed by four cables each with 12 numbers of 5mm diameter wires placed are at each corner with 50mm effective cover. Transfer prestress is 1000N/mm2. Calculate the capacity of the section when the position of the neutral axis is 200mm from the highly compressed edge. M40 concrete is used.
23. Explain the design procedure of PSC cylindrical water tank.
24. Discuss shear in the composite beams. What are the provisions usually made to counteract the effects.
25. What are the advantages of prestressed concrete poles.
26. Design a precast pretensioned column to carry an axial load of 100KN and bending moment of 12KNm. Its actual length is 3m with bottom end rigidly fixed and top imperfectly fixed. Fck=40N/mm2, 7mm diameter prestressing wires are stressed to 1500N/mm2, loss of prestress=20%.
27. Explain the significance of anchorage zone reinforcement.
28. The end bock of a post tensioned prestressed concrete beam 300mm wide and 300mm deep is subjected to a concentric anchorage force of 832KN by a Freyssinet anchorage of area 11700mm2. Design and detail the anchorage reinforcement for the end block.
29. Explain hoyer’s effect in the phenomenon of bond in pretensioned beam.
30. A prestressed concrete member is post tensioned by 4 tendons of 250mm2 each. The tendons are tensioned one after other to the stress of 1000N/mm2. Compute the loss of prestress due to elastic shortening of concrete. How can the loss be counteracted?
31. A post tensioned prestressed concrete beam of rectangular section 250mm wide is to be designed for an imposed load of 12KN/m uniformly distributed over a span of 12m. The stress in the concrete must not exceed 17N/mm2 in compression or 1.4 N/mm2 in tension at any time and the loss of prestress may be assumed to be 1.5%. calculate the depth of the beam ,prestressing force and eccentricity.
32. A small precast prestressed concrete beam is to be designed to cover a span of 12m and to carry a super imposed load of 15KN/m. The permissible stress in compression can be 14N/mm2. Design the beam using stress range approach.
33. A rectangular beam 100mmX250mm spanning over 8m is prestressed by a straight cable carrying an effective prestressing force of 250KN located at an eccentricity of 40mm. The beam supports a live load of 1.2KN/m. Calculate the resultant stress distribution for the central cross section of the beam.
34. A post tensioned concrete beam 100mmX300mm is prestressed by 3 cables each with a cross section area of 50mm2 and with an initial stress of 1200N/mm2. All the three cables are straight and located 100mm from the soffit of beam. If the modular ratio is 6, calculate the loss of stress in the cables due to elastic deformation of concrete for successive tensioning of the cables one at a time.
35. Design for flexure a pretensioned rectangular beam with constant eccentricity over an effective span of 10m. Live load is 10KN/m. Assume fcto =42N/mm 2 fcci =14N/mm2 ; fccf =16N/mm2, feti =1.4N/mm2. 5mm diameter wires with fp =1600N/mm2 and stress during initial tension=80% of fp and losses=20%
36. Explain the design of end block of a prestressed concrete member by any one method.
37. Design the thickness and circumferential reinforcement required for a cylindrical tank wall subjected to a design tensile force of 500KN/m. The permissible compressive stress in concrete at transfer fcf =16N/mm2 and the permissible tensile stress in concrete under working loads ftw=0.8N/mm2 . the loss ratio=0.8. 5mm dia wires of ultimate tensile strength of 1700N/mm2 with an initial stress of 1000N/mm2 may be used. The direct tensile strength of concrete is 2.5N/mm2 . a load factor of 2 at the limit state of collapse and 1.25 against cracking is required.
38. What is meant by partial prrestressing? Discuss advantages and disadvantages when partial prestressing is done.
39. Explain briefly the advantages of prestressed concrete piles.
40. Explain briefly the advantages and design considerations of prestressed concrete poles.
41. Design a tank wall of a PSC circular water tank of dia 50m and storage height 12.5m. the permissible stress in concrete at transfer is 13 Mpa. Residual comp stress is 1Mpa. 7mm HTS wire having fp =1650MPa is available for winding and freyssinet cables of 12 wires of 8mm for vertical prestressing. Concrete grade is M40. The tank wall is supported on electromeric pads.
42. Design a partially prestressed mast for the following and checker for limit state of collapse and cracking. Spacing 100m, free standing height 10m above GL, with cross tree at 9m having twin conductor guide of 0.6m apart. Tension in each conductor is 5KN. Grade of concrete M50. 5mm HT is available. Assume other data suitably.
43. A standard section of prestressed unit is an I section having flange 250X100mm and 500X250mm and web 100X305mm. Design a composite slab bridge using these sections for an effective span of 12m. The imposed load on the deck is 50kPa. Concrete grade M40 for precast unit and the transfer strength 40MPa. For insitu the grade of concrete is M30. Also check for safety.
44. A PSC beam of effective span 6m supports a UDL of 4 KN/m including self weight. The size of the beam is 120X300mm and its prestressed with a curved cable of concentric at supports and 50mm eccentric below cg line at mid span. If the effective prestressing force is 180KN locate the thrust point at mid span section.
45. A PSC beam of span 8m has the following data:

Area =32X103 mm2, E=38KN/m2 width of gystain 72mm

Cable: parabolic, 6 wires of 7mm HTS, concentric at supports and eccentric by 50mm at mid span.

Fpe= 1000N/mm2

Determine the deflection for the following cases:

1. Self weight+prestress
2. Self weight+prestress+live load of 3KN/m.
3. A post tensioned prestressed concrete beam of rectangular section to be designed to support an imposed load of 12KN/m over a span of 12m. The width of beam is restricted to 250mm. Loss ratio=0.85. the permissible stresses in concrete at transfer at 14N/mm2 in compression and zero in tension. At working loads, the respective stresses of 17 N/mm2 and 1.5N/mm2  are permitted. Determine the minimum possible depth of the beam section. Design also the minimum prestressing force required and the corresponding eccentricity. Find the no of freyssinet cables, each containing 12 wires of 7mm dia and stressed to 1280 N/mm2 required at the centre of span.
4. Discuss briefly the factors influencing the short term and long term deflections of prestressed concrete members.
5. Develop an expression for the minimum section modulus of a prestressed concrete section in terms of the minimum and maximum moments, loss ratio and permissible stresses in concrete at transfer and at working loads.
6. A prestressed concrete pile 250mmX250mm in cross section contains 60 pretensioned wires of 2mm diameter uniformly distributed over the cross section. The wires are initially tensioned on the prestressing bed with a total force of 300KN. If the modular ratio is 6.5, calculate the stresses in steel and concrete immediately after transfer of prestress, allowing for the loss of prestress due to elastic shortening of concrete. If the concrete undergoes a further shortening due to a creep of 3X10-5 mm/mm per N/mm2 of stress and a unit shrinkage of 200X10-6 , while there is a relaxation of 5% steel stress due to creep of steel, find the greatest tensile stress which can occur in a pile of 20m length, when lifted at two points 4m from each end.
7. Show that a change in the external moment in the elastic range of a prestressed concrete beam results in a shift of the resultant thrust line rather than an increase in the resultant force in the beam.
8. Mention the different methods of improving the shearing resistance of a concrete beam using prestressing techniques.
9. Discuss the basis of IS 1843 code clause for failure of a prestressed concrete member due to fracture of steel in tension.
10. Sketch the details of different types of joints used between the wall and floor of prestress concrete tanks. Discuss the sealing requirements.
11. Write notes on the end block design and transmission length.
12. A pretensioned beam of a rectangular section 400mm wide and 600mm deep has 1700mm2 of high tensile steel wires located at an effective eccentricity of 240mm. The cube strength of concrete is 55N/mm2 and ultimate tensile strength of high tensile steel wires used being 1600N/mm2. Determine the type of failure to be expected and flexural strength of the section using IS 1343 recommendations.

Find the maximum area of untensioned steel with yield strength of 415N/mm2, located 60mm from the soffit, which just ensures the failure of the above section by yielding of steel(balanced section) and estimate flexural strength of this section with the untensioned steel. What is the minimum area of high tensile steel required in the given section to avoid failure of steel in tension?

56.A rectangular concrete beam 230mm wide 450mm deep and 4m span is prestressed by 650 kN force at a constant eccentricity of 75mm. The beam supports three concentrated loads of 25kN at each quarter span points. Determine the location of the pressure line at the centre, quarter span and support sections of the beam. Neglect the moment due to self of the beam.

57. A rectangular concrete beam 150mm wide 300mm deep and 6m span with 87 radius of gyration is prestressed by 8 wires of 8mm diameter by 400kN force. The tendon eccentricity at mid span is 75mm and zero at supports. The beam supports an udl of 5kN/m over entire span. Determine the magnitude of central deflection for the following cases, ignoring all losses in prestress.

(i) Self weight + Prestress

(ii) Self weight + Prestress + Imposed load

58.A PSC T – section has 1800 mm x 200mm flange, 450mm x 1500mm rib and 100 numbers of 8mm HTS wires located at 1600mm from the top of flange. Calculate the flexural strength of beam using M40 and Fe1600.

59.The end block of the PSC beam in problem 11(a), has a Freyssinet anchorage area of 9200mm2. Design and detail the anchorage reinforcement for the end block.

60. (1) Explain the criteria of design and

( ii ) Design procedure for PSC circular tanks.

61. ( i ) With neat sketches, explain the various cross sectional profiles adopted for PSC poles.

( ii ) State the general advantages of PSC poles.

62.A simply supported PSC beam of span 5m and size 150mm x 300mm has 15MPa prestrees at soffit and zero at top after all losses in prestress. A slab of 450 mm wide and 60mm deep in cast on the top of the beam to induce composite T-beam action. Find the maximum udl that can be supported without any tensile stress at soffit for the following conditions.

(i) slab is externally supported during casting

(ii) slab is supported by the PSC beam during casting.

63. (i) Explain the advantages ofusing precise prestressed elements along with in-situ concrete.

(ii) Explain different types of composite construction with sketches.

64.With figures, explain the construction sequence and tendons profiles of segmental PSC balanced cantilever  
 bridges.

65.Write the design procedure of post tensioned PSC T-beam slab bridge deck.

66. A PSC beam supports a live load of 4 kN/m over a simply supported span of 8m. The beam has an I section with a overall depth of 400mm. The thicknesses of flange and web are 60mm and 80mm respectively. The width of the flange is 200mm. The beam is to be prestressed by an effective prestressing force of 235 kN at a suitably eccentricity such that the resultant stress at the soffit of the beam at the centre of the span is zero.

(i) Find the eccentricity required for the force.

(ii) If the tendon is concentric, what should be the magnitude of the prestressing force for the resultant stress to be zero at the bottom fibre of the central span section?

67. A PSC beam of breadth 250mm and depth 300mm is simply supported on an effective span of 6.0m. It is prestressed by a parabolic cable with an eccentricity of 75mm below the centroid at the mid span section and 45mm above centroid at the support section. Prestressing force is 480kN. Calculate the initial midspan deflection. Assume the unit weight of concrete as 25 kN/m and modulus of elasticity concrete as 2.5 x 104 N/mm2.

68. The cross-section of a symmetrical I section prestressed beam is 300 mm by 750 mm (overall), with flanges and web 100 mm thick. The beam is post-tensioned by cables containing 48 wires of 5 mm diameter high tensile steel wires at an eccentricity of 250mm. The 28 day strength of concrete in compression is 40 N/mm2 and the ultimate tensile strength of wires is 1700 N/mm2. Assuming that the grouting of the tendons is 100percent effective, determine the ultimate moment of the section as per IS 1343.

69. The end block of a prestressed concrete beam, rectangular in section, is 10mm wide and 200mm deep. The prestressing force of 100 kN is transmitted to concrete by a distribution plate, 100 mm wide and 50 mm deep, concentrically located at the ends. Calculate the position and magnitude of the maximum tensile stress on the horizontal, section through the centre and edge of the anchor plate. Compute the bursting tension on these horizontal planes.

70. design a prestressed concrete pipe of internal diameter 900mm to withstand an internal pressure of 0.8 N/mm2. the maximum permissible compressive stress in concrete is 18 N/mm2 and no tensile stress is to be permitted. Modular ratio between steel and concrete is 5.8.Adopt 5mm diameter tensile wires which can be stretched upto 1100N/mm2.Expected loss of prestress is25%

71. Design an electric pole 12m height to support wires at its top at which can exert a reversible horizontal force of 3kN. The tendons are initially stressed to 1000 N/mm2and loss due to creep and shrinkage is 15%. Maximum compressive stress in concrete is limited to 12 N/mm2. Assume modular ratio 6. Angle of repose =30 degrees and specific weight of soil as 18 kN/m3.

72. A precast prestressed concrete beam of rectangular section has breadth of 100mm and depth of 200mm. the beam with a span of 5m is prestressed by tendons with their tendons coinciding with the bottom kern. The initial force in the tendons is 150kN. The loss of prestress may be assumed to be 15% The beam is incorporated in composite T beam by casting a top flange of breadth 400mm and thickness 40mm.if the composite beam supports a live load of 8kN/m. Calculate the resultant stresses developed in the precast and insitu cast concrete assuming the prestressing beam as

1. Un-propped
2. Propped during casting of the slab. Assume the same modulus of elasticity for both the cases

73.A composite T girder of span 5m is made up of a pretensioned rib, 100mm wide by 200mm deep, with an insitu cast slab 400mm wide and 400mm thick the rib is prestressed by a straight cable having an eccentricity of 33.33mm and carrying an initial force of 150kN.the loss of prestress may be assumed to be 15%Check the composite T beam for limit state of deflection if it supports an imposed load of 3.2kN/m for

i. Un-propped construction

ii. Propped construction. Assume E as 35N/mm2 for both precast and

insitu cast construction

74. A composite bridge deck is made up of an cast in situ slab 120mm thick and symmetrical I section of precast pretensioned beam having flange width and thickness as 200mm and110mm resp. Thickness of web is 75mm and overall depth is 500mm.Spacing of I beams 750mm c/c. E = 30kN/mm2. Estimate the stress developed in the composite member due to differential shrinkage 100 x 10-6 between the precast and cast in situ elements.

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