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SUBJECT CODE NO:- P-187

FACULTY OF ENGINEERING AND TECHNOLOGY

B.E.(Civil) Examination MAY/JUNE-2016

Elective-I: Prestressed Concrete

(Revised)

[Time:Three Hours] **[Max Marks:80]**

"Please check whether you have got the right question paper."

N.B
1. Solve any three questions from section A & B.
2. Use of IS 1343 & 456 is allowed.
3. Assume suitable data & mention it clearly.
4. Draw neat sketches wherever necessary.

Section A

Q.1 a) Enumerate advantages and limitations of prestressed concrete. 04

b) Which are the various methods of prestressing? Explain any one method. 05

c) Explain with sketches prestressing force and pressure lines at support, mid span and quarter span. 05

Q.2 A rectangular beam 200×300mm deep is prestressed by 550KN at constant eccentricity of 50mm. The beam supports a concentrated load of 70KN at mid-span and the span of beam is 3m. Determine the location of the pressure line at centre, support & at the quarter span. Ignore self-weight. 13

Q.3 A rectangular beam of size 300×200mm is prestressed by 15Nos. of 5mm ϕ located at 65mm from bottom & 3 wires of 5mm ϕ from top. Effective prestress in steel is 840 MPa. 13

a) Calculate the stress at extreme fibre at the mid span section when the beam is carrying its own weight over a span of 6m and

b) If audl of 6KN/m is imposed & modulus of rupture of concrete is 6.5MPa, obtain the maximum working stress in concrete, estimate the load factor against cracking.

Q.4 a) What is anchor block? Explain with the help of sketch the stress distribution in end block with single and double anchor plate. 03

b) The end block of a beam, 120mm wide & 300mm deep having a transmitting force of 250KN by a distribution plate 20mm wide & 75mm deep, concentrically located at the ends. Calculate the position &magnitude of maximum tensile stresses on the horizontal section through the centre of the end block using Guyon's method. Compute the bursting tension on these horizontal planes and required reinforcement for the same. 10

Consider following data.

Dist. ratio	Position of zero stress	Position of max. stress	Ratio of max. to avg.
0.2	0.14	0.30	0.36
0.3	0.16	0.36	0.33
0.4	0.18	0.39	0.27

Q.5 a) Explain in detail the loss due to creep of concrete. 03

b) A post tensioned cable of a beam having span of 10m is initially tensioned to a stress of 1KN/mm^2 at one end. If the tendons are curved so that the slope is 1 in 24 at each end with an area of 600mm^2. Calculate the loss of prestress due to friction for the following data: 10

Coe.of friction =0.55

Friction coe. For wave effect = 0.0015/m

During anchoring if there is a slip of 3mm at the jacking end, calculate the final force in the cable and the percentage loss of prestress due to friction and slip.

Section B

Q.6 a) What are the different types of flexural failure? Explain in detail with stress diagram under reinforced failure of the section. 04

b) Explain the need of providing minimum shear reinforcement in any section; hence explain the web shear cracks in PSC member. 05

c) Explain the design steps for analysis of composite section. 05

Q.7 A double tee section having a flange 1100mm wide and 150mm thick is prestressed by 4700mm^2 of HYSD located at a depth of 1600mm. the ribe of having thickness of 150mm each. Assume fck=40MPa&fy =1600MPa. Determine the flexural strength of the double tee girder using IS: 1343 provisions. 13

Q.8 Design a post tensioned PSC two-way slab 6×8m in size to support a L.L=3KN/m^2, if cables of 4×5mm ϕ are stresses to 1KN/mm^2 are available for use, design the spacing of cables in two directions & check the safety for excessive deflection at service load. Consider all the edges of the slab as discontinuous. Assume fck=40MPa, fp=1600N/mm^2. The permissible comp & tensile stresses are 14MPa & zero respectively. 13

Q.9 a) Explain the design procedure of PSC pole & state its advantages. 03

b) A non-cylindrical pipe of 1000mm ID and 75mm thick is required to convey water at working pressure of 1.5MPa. the length of pipe is 6m; maximum & minimum comp. stress of conc. Is 15 & 2 MPa, & loss ratio is 0.80. 10

a. Design circumferential wire winding using 5mm dia. Wires stressed to 1KN/mm^2.

b. Design longitudinal prestressing using 7mm wires tensioned to 1KN/mm^2. The max. Per. Tensile stress under critical loading should not exceed 0.8 fck ½ where fck=40MPa.

Q.10 A PSC beam of symmetrical I section has an overall depth of 2.0m & thickness as 200mm, span is 45m. The beam is prestressed by cables which are concentric at support & have eccentricity of 750mm at the centre of the span. The force is 12×10^3 KN at transfer edge. Fck=40MPa, estimate the shear strength of support section. If ultimate shear force the support due to dead load is 2834 KN & the loss ratio is 0.80. Design suitable shear reinforcement using Fe_{415}, consider the area of section is 0.88×10^{6}mm^2. 13