

**Seventh Semester B.Arch. Degree Examination, Dec.2018/Jan.2019**  
**Structures – VII**

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions.**  
**2. Use of IS-1343-1980 permitted.**

- 1 a. Explain the necessity of using high strength steel and concrete in PSC structures. (06 Marks)  
 b. A PSC beam 400mm×600mm in section has a span of 6 m and is subjected to a udl of 1600 N/m including the self weight of the beam. The prestressing tendons are located along the longitudinal centroidal axis of the beam and providing effective pre-stressing force of  $96 \times 10^4$  N. Determine the extreme fibre stresses in concrete at the midspan section. (14 Marks)
- 2 a. Explain pre-tensioning and post-tensioning in detail. (06 Marks)  
 b. A PSC beam provided with a bent tendon with an eccentricity of 100 mm at the centre and 50 mm at the ends also providing a pre-stressing force of  $100 \times 10^4$  N. The beam carries a central point load of  $16 \times 10^4$  N. The beam span is 6 m. Determine the stress distribution for the end section and mid section of the beam. [ $D_c = 24 \text{ kN/m}^3$ ]. (14 Marks)
- 3 a. What are the types of losses in PSC beam and how do you calculate each loss stating with an expression. (06 Marks)  
 b. A prestressed concrete beam 100mm×300mm is prestressed by straight wires carrying an initial force of 150 kN at an eccentricity of 50 mm. Estimate the percentage loss of stress in steel due to elastic deformation of concrete if the area of the steel wires is  $188 \text{ mm}^2$ . Take  $E_s = 210 \text{ kN/mm}^2$  and  $E_c = 35 \text{ kN/mm}^2$ . (14 Marks)
- 4 a. Explain load balancing concept and pressure line in PSC. (06 Marks)  
 b. A concrete beam post tensioned by a cable carrying an initial stress of  $1000 \text{ N/mm}^2$ . The slip at the jacking end was observed to be 5 mm. The modulus of elasticity of steel is  $210 \text{ kN/mm}^2$ . Estimate the percentage loss of stress due to anchorage slip if the length of the beam is, (i) 30 m and (ii) 3 m. (14 Marks)
- 5 a. Explain types of shells with neat sketches. (10 Marks)  
 b. Explain pneumatic structures with neat sketches. (10 Marks)
- 6 a. What is grid structures? Explain. (10 Marks)  
 b. What are space frames? What are the advantages and applications of the same? Explain. (10 Marks)
- 7 Two way slab of size 5m×4m internally. Simply supported on 230 mm. Thick wall, Thickness of slab = 150 mm steel along short span = 10 mm @ 150 mm C/c  
 Steel along long span = 8 mm  $\phi$  @ 250 C/C  
 Draw neat : (a) Plan showing reinforcement details. (b) Cross section along short span. (20 Marks)
- 8 A square column of size 250mm×250mm is resting on square footing of size 1m×1m. Thickness of footing is 350 mm.  
 (i) Column main bars (8 no – 16 mm  $\phi$  with lateral ties 8 mm  $\phi$  @ 250 mm C/C)  
 (ii) Footing (Main bars 8 no – 12 mm  $\phi$  @ 150 mm C/C in both ways)  
 (iii) Draw neatly  
 a) Plan showing column and footing reinforcement.  
 b) Cross section of column and footing. (20 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8=50, will be treated as malpractice.