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09ENG7.5

**Seventh Semester B.Arch. Degree Examination, June/July 2019**  
**Structures – VII**

Time: 3 hrs.

Max. Marks: 100

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

- 1 a. What are the advantages of PSC over RCC? (08 Marks)  
b. A PSC beam  $400 \times 600$ mm in section has a span of 6m and is subjected to a uniformly distributed load of 16000 N/m including self weight of the beam. The prestressing tendons located along the longitudinal centroidal axis provide an effective prestressing force of  $96 \times 10^4$ N. Determine the extreme fibre stresses in concrete at the midspan section. (12 Marks)
- 2 a. Explain "Load balancing Concept" and "Pressure line" in PSC. (08 Marks)  
b. A rectangular concrete beam 250 mm wide by 300mm deep is prestressed by a force of 540kN at a constant eccentricity of 60mm. The beam supports a concentrated load of 68kN at the centre of span of 3m. Determine the location of the pressure line at the centre, quarter span and support sections of the beam. Neglect the self weight of the beam. (12 Marks)
- 3 a. Explain loss of prestress due to shrinkage of concrete. (05 Marks)  
b. A PSC beam  $200 \times 300$ mm and span 6m is initially prestressed by a force of 400kN applied at a constant eccentricity of 70mm by tendons of area  $400\text{mm}^2$ . Take  $E_s = 2 \times 10^5 \text{ N/mm}^2$ ,  $E_c = 0.333 \times 10^5 \text{ N/mm}^2$ , Anchorage slip = 1.5mm, creep coefficient of concrete = 2.0, shrinkage strain in concrete = 0.0002, relaxation in steel = 3%. Find the percentage loss of prestress in tendons. Also take  $\mu = 0.50$ , wave coefficient =  $K = 0.0015/\text{m}$ . (15 Marks)
- 4 a. What are space frames? What are the advantages of space frames? Give their applications. (10 Marks)  
b. What are flat slabs? What are its advantages and disadvantages? (10 Marks)
- 5 a. What are folded plates? Explain their structural behavior. Give their field applications. (10 Marks)  
b. What are the types of shell structures? Explain the advantages of shell roofs over conventional roofs. (10 Marks)
- 6 a. What are pneumatic structures? Explain types of pneumatic structures used in practice. (10 Marks)  
b. Explain the structural behavior of i) Domes ii) Barrel Vaults. (10 Marks)
- 7 a. Draw the plan and sectional elevation showing the details of reinforcements for a square column footing with the following data:  
Column size :  $600 \times 600$ mm, column reinforcement – 12 bars of 16 mm  $\phi$ , with 4 legged 8mm  $\phi$  ties at 200%. Column footing – 3m  $\times$  3m. Overall depth of footing – 800mm. Footing reinforcement- $20\phi @ 140$  c/c both ways. (12 Marks)

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.

- b. A simply supported R.C.C. slab is to be provided for an office floor having clear dimensions of 4m by 10 with 230mm wall all round. Draw sectional elevation showing details of reinforcements. Assume data required. (08 Marks)

8 Write short notes on any four of the following:

- a. Pretensioning
- b. Post tensioning
- c. Tensile structures
- d. Applications of prestressed concrete
- e. Geodesic dome structures.

(20 Marks)

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