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09ENG7.5

**Seventh Semester B.Arch. Degree Examination, Dec.2015/Jan.2016
Structures - VII**

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions.
2. Use of IS – 1343 is permitted.
3. Missing data, if any may be suitably assumed.**

- 1
 - a. What are the advantages of PSC? (08 Marks)
 - b. A prestressed concrete beam of section 120mm wide and 300mm deep is used over an effective span of 6m to support an udl of 4kN/m (exclusive of self weight). The beam is pre-stressed by a straight cable carrying a force of 180kN and located at an eccentricity of 50mm. Determine the location of thrust line in the beam and plot its position at quarter and central span sections. (12 Marks)

- 2
 - a. What are the types of losses coming under pre-tensioned and post-tensioned sections? (08 Marks)
 - b. A pre-tensioned concrete beam 200×300 mm and span 6m is initially pre-stressed by a force of 400kN applied at a constant eccentricity of 70mm by tendons of area 400mm^2 . If $E_s = 2 \times 10^5\text{N/mm}^2$, $E_c = 0.333 \times 10^5\text{N/mm}^2$, Creep co-efficient in concrete = 2.0, Shrinkage strain in concrete = 0.0002, stress relaxation in steel = 3%. Find percentage loss of stress in tendons. (12 Marks)

- 3
 - a. Draw a neat sketch and explain the distribution of stress in a beam at the mid span and at the support, pre – stressed by a linear eccentric cable. The beam is loaded with a uniformly distributed load. (08 Marks)
 - b. A concrete beam having a rectangular section 150×300 is prestressed by a parabolic cable at an eccentricity of 75mm at midspan towards bottom (Soffit) and at eccentricity of 25mm towards top at support sections. The effective pre – stressing force is 350kN. The beam supports a concentrated load of 20kN at centre of span in addition to the self – weight with a span at 8m. Find the short term deflection at centre of span under pre – stress, self weight and live load. Find also the long term deflection if the loss ratio is 0.8 and the creep co-efficient is 1.6. $E_c = 38 \text{ kN/mm}^2$. (12 Marks)

- 4
 - a. Briefly discuss the load balancing concept in pre – stressed concrete. (08 Marks)
 - b. A concrete beam with a single overhang is simply supported at A and B over a span of 8m and overhang BC is 2m. The beam is $300\text{mm} \times 900\text{mm}$ and supports 3.52 kN/m uniformly distributed load. Determine the profile of the cable to balance the Dead Load and the Live Load. (12 Marks)

- 5
 - a. What are Pneumatic structures? Explain their behaviour. (10 Marks)
 - b. Write a note on : (10 Marks)
 - i) Space structures
 - ii) Tensile structures.

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.

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- 6 Write short notes on :
- a. Flat slabs.
 - b. Shell structures.
 - c. Grid floor.
 - d. Folded plates. **(20 Marks)**
- 7 Show the structural detailing of a typical one way slab, simply supported on the walls. Provide the neat sketch showing plan and cross – section. **(20 Marks)**
- 8 a. Draw sectional elevation of column and footing with reinforcement details. **(10 Marks)**
b. Draw sectional elevation of one flight of dog – legged stair case with reinforcement details. **(10 Marks)**
