B. Tech Degree VI Semester (Supplementary) Examination June 2006

CE 603 DESIGN OF STRUCTURES II

(1998 Admissions)

Time : 3 Hours Maximum Marks : 100

(Use of IS 456, IS 800, IS 1343 and SP16 are permitted)

I. (a) Explain the use of SP-16 in column design. (5)

(b) A rectangular column of effective height of 4m is subjected to a characteristic axial load of 800kn and bending moment of 100kNm about the major axis of the column. Design a suitable section for the column so that the width should not exceed 400mm. Use the minimum percentage of longitudinal steel.

Assume $fy = 415N/mm^2$ & $fck = 20N/mm^2$. (20)

OR

II. (a) Explain the design procedure of an open-well staircase. (5)

(b) Design a dog-legged staircase for a floor to floor height of 3.1m. All the four sides are supported on brick walls 230mm thick and the internal width of the stair-room is restricted to 2m. Length of the stair-room may be suitably assumed. Use M_{15} concrete and Fe-415 steel. (20)

III. (a) Explain the Freyssinet system of pre-stressing . (5)

(b) In a pre stressed concrete beam of cross-section 200mm x 300mm and span 6m an initial pre stressing force of 400kN is applied at an eccentricity of 70mm by tendon of area 400mm^2. Assuming $E_s = 2\times10^5 N/mm^2$ and $E_c = 3.33\times10^4 N/mm^2$. Anchor slip = 1.5mm creep coefficient of concrete = 2, concrete shrinkage = 0.002 and creep in steel = 3%. Find the percentage loss in pre stress. (20)

OR

IV. (a) What are the assumptions in the design of pre stressed concrete and explain the general principles of pre-stressing? (8)

(b) A pre-stressed concrete slab has a span of 10m. It supports a dead load of 4KN/sq.m excluding its own weight and a live load of 6KN/Sq.m. Design the slab at mid span and check the stresses. Draw neat sketch. (17)

V. (a) Write short notes on bracing and lacing with sketches. (5)

(b) Design the built-up column composed of two channel section placed back to back carrying an axial load of 1400KN. The column having a length of 7.5^m is effectively held in position at both ends but restrained against rotation at one end only. Design the batten plates also. Assume $fy = 250N/mm^2$ (20)

OR

VI. (a) Name different types of column bases and where it is used. (5)

(b) Design a two tier grillage foundation to carry an axial load of 1000KN. The base plate is 700mm x 700mm below the stanchion. The concrete is M_{20} grade and bearing pressure of the earth is limited to 150KN/m^2. (20)

VII. Design an angle iron purlin for a trussed roof from the following data:

Span of roof truss = 12^m

Spacing of roof truss = 5^m

Spacing of purlins along the slope of the roof truss = 1.2^m

Slope of roof truss = vertical to 2 horizontal

Wind load on roof surface normal to roof = 1.04KN/m^2

Vertical load from roof sheeting etc = 0.200KN/m^2 (25)

OR

VIII. Design a self supporting steel chimney of height 45m and diameter 4m with a lining thickness of 100mm. Wind pressure is 1.5KN/m^2. (25)

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