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ECE-601

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100601

Roll No.

# B. Tech.

## (SEM. VI) THEORY EXAMINATION, 2014-15

## DESIGN OF CONCRETE STRUCTURES - II

Time : 3 Hours] [Total Marks : 100

Note : (1) Attempt all questions.
(2) IS-456:2000 is permitted.
(3) Show the structural details in all design problems.
(4) Assume any suitable data, if not given.
(5) Answer all questions.

1 Attempt any two parts of the following : 10×2=20

(a) Design an interior panel of a flat slab with drop for a live load of 4 kN/m$^2$. The slab is provided with a floor finish of 1 kN/m$^2$. The size of panel is 6m ×6m. Use M-20 grade concrete and Fe-415 steel.

(b) Discuss the direct design method for the design of flat slab. Also discuss shear considerations.

(c) A flat slab is supported on 500 mm dia. columns. Column spaced at 8m × 7m apart in both directions. The column head has a dia. of 1000 mm. Determine the moments in flat slab along its 8 m span for end panel as well as for interior panel for column and middle strips. Take live load of 4.5 kN/m$^2$. Use M-20 concrete and Fe-415 steel.

2 Attempt any two of the following : **10×2=20**

(a) A curved beam is size 300 mm × 600 mm and subjected to a bending moment 120 kN/m at support and 80 kN/m at midspan twisting moment of 10 kN/m and max. SF of 100 KN at collapse. Design the beam. Use M-20 grade concrete and Fe-415 grade steel.

(b) Design a footing for the 250 mm × 500 mm size RCC column transmitting a load of 300 kN. The bearing capacity of soil to be taken as 90 kN/m$^2$ at 1.0 m below GL. Use M20 concrete and Fe415 grade steel.

(c) A square column 450 mm × 450 mm supports an axial load 1600 kN. Design a square footing for the column. The safe bearing capacity of the soil in 250 kN/m$^2$. Use M-25 concrete and Fe-415 grade steel.



3 Attempt any two parts of the following : **10×2=20**

(a) Design the RC cantilever retaining wall, retaining levelled earth 5m above base slab. Take the density of earth as 18 kN/m$^3$ and angle of repose of soil as 30 degree. Toe projection 1.8 m, heel projection 1.7 m and thickness of base slab as 450 mm.

(b) What are the various component of counterfort retaining wall ? Explain the concept of its design.

(c) Design a slab culvert for a clear span of 4m having a clear road way width of 7.5m between kerbs for IRC class AA tracked loading, wearing coat is 80 mm thick. Use M-25 concrete and Fe-415 steel.

4 Attempt any two parts of the following : **10×2=20**

(a) Desian a square water tank 5m × 5m × 3m (high) using any method. Tank is open at top and the fixed to the flat base which rests on ground.

(b) Design a vertical wall and base of flat base circular water tank with flexible joint with base. The capacity of tank is 1000 kL. The depth of water tank is restricted to 4.5 m, the tank base is resting on ground. Use M-25 concrete and Fe-415 steel.

(c) What is intz tank ? What are its various structural components ? Discuss how various components of container are designed.

5 Attempt any two parts of the following : **10×2=20**

(a) Explain with neat sketches the basic principles of pre-stressed concrete subjected to (i) axial prestressing (ii) eccentric prestressing. Discuss the necessity of using high strength concrete and high tensile steel in prestressed concrete works.

(b) What are the various systems of prestressing ? Explain the various mechanical anchoring devices used in post tensioning work with neat sketches.

(c) A prestressed concrete beam of rectangular section 120 mm wide and 300 mm deep is prestressed by 6 wires of 6 mm dia provided at an eccentricity of 55 mm. The initial stress in the wires is 1150 $N/mm^2$. Find the various losses of stress. Take $E_s = 2\times10^5$ $N/mm^2$; $E_c = 3\times10^4$ $N/mm^2$ and creep coefficient of concrete = 1.5. M40 concrete has been used in the beam.

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