10CE23

FOUR YEAR B.TECH DEGREE EXAMINATIONS, APRIL 2013

III B.Tech II Semester

Branch: Civil Engineering

Paper: RCC Structural Design – II

Time: 3 Hours

Max. Marks: 60

Answer any **one** question from each Unit.

UNIT – I

1. Design a trapezoidal footing for the two columns A and B transmitting service loads of 800 KN and 1600 KN respectively. The column A is 400 mm X 400 mm and column B is 600 mm X 600 mm in size and they are spaced at 5.0 m centre. The property line is 300 mm beyond the face of column A. The safe bearing capacity of soil at site is 150 KN/m^2. Adopt M-20 grade concrete and Fe-415 grade HYSD bars. **(15M)**

OR

2. Design a reinforced concrete rectangular footing of width not greater than 2.75 m for a column of section 250 mm X 500 mm which is subjected to an axial load of 1500 KN at service state. Consider,

   Density of the soil = 20 KN/m^3

   Angle of repose = 30°

   Allowable bearing capacity of soil = 150 KN/m^2.

   Use M-20 grade concrete and Fe-415 grade steel. **(15M)**

UNIT-II

3. Design a cantilever retaining wall to retain the earth with a backfill sloped of 20° to the horizontal. The top of the wall is 5.5 m above the ground level. Assume the depth of foundation as 1.2 m below the ground level with a safe bearing capacity of 120 KN/m^2. The unit weight of the backfill is 18 KN/m^3 and an angle of shearing resistance of 35°. Also assume the coefficient of friction between soil and concrete as 0.55. Adopt M-20 grade concrete and Fe-415 grade of HYSD bars. **(15M)**

OR

4. Design a counterfort type retaining wall to support an earth fill of 6.0 m above the ground level. The safe bearing capacity of soil at site is 160 KN/m^2. Unit weight of soil may be taken as 16 KN/m^3 and an angle of shearing resistance of 33°. Assume the value of coefficient of friction as 0.55. Spacing of counterforts is 3.0 m centre to centre. Adopt M-20 grade of concrete and Fe-415 grade HYSD bars. Sketch the details of reinforcements in the retaining wall. **(15M)**

UNIT-III

5. A prestressed concrete beam 200 mm wide and 300 mm deep is prestressed with wires of area 320 mm^2 located at a constant eccentricity of 50 mm and carrying an initial stress of 1000 N/mm^2. The span of the beam is 9.0 m. Calculate the percentage loss of stress in the wires if the beam is (a) pretensioned and (b) post tensioned,
Using the following data:
$E_s = 210$ KN/mm^2 and $E_c = 35$ KN/mm^2;
Relaxation of steel stress = 5 percent of the initial stress;
Shrinkage of concrete = 300 X 10^{-6} for pretensioning and 200 X 10^{-6} for post tensioning;
Creep coefficient (Φ) = 1.6;
Slip at anchorage = 1 mm;
Frictional coefficient for wave effect = 0.00154 per m. **(15M)**

OR

6. A beam of symmetrical I-section spanning 9.0 m has a flange width of 250 mm thick and a flange thickness of 75 mm respectively. The overall depth of the beam is 500 mm. Thickness of the web is 100 mm. The beam is prestressed by a parabolic cable with an eccentricity of 180mm at the center and zero at supports with an effective prestressing force of 120 kN. The live load on the beam is 2000 N/m. Draw the stress diagram at the mid span section for the following conditions:
   (a) Prestress + Self-weight.
   (b) Prestress + Self-weight + Live load.
   Take density of concrete as 25KN/m^3. **(15M)**

UNIT-IV

7. A circular tank has an internal diameter of 10 m and has maximum height of water as 4.0 m. the walls of the tank are restrained at the base. Determine the values of maximum hoop tension and its position, moment at the base and shear at the base using IS Code tables. Assume thickness of wall as 160 mm. **(15M)**

OR

8. Design an intz water tank of 60,000 litres capacity. The height of staging is 12 m upto bottom of the tank. Use membrane analysis. The wind pressure to be 1.5 KN/m^2 and bearing capacity of soil is 120 KN/m^2. Use M-20 grade concrete and Fe-415 grade HYSD bars. **(15M)**