B. Tech Degree VI Semester Examination, April 2008
CE 603 DESIGN OF STRUCTURES II
(1999 Scheme)

Time : 3 Hours   Maximum Marks : 100

(All relevant IS codes are permitted)

I.   Design a circular reinforced concrete column to carry an axial load of 1200kN. The
        column shall remain continuous through reinforced concrete beam and slab floors at
        both the ends. Use M20 concrete and steel Fe 415. clear height between the floor
        and soffit of shallow beam is 6m. Draw neat sketches showing reinforcement details.
        Use spiral transverse reinforcement.   (20)

OR

II.   A column 450mm x 450mm in size with 8-18 mm steel bars carries an axial load of
        1480 kN transfers this to the footing. Design a square footing to support this column.
        The bearing capacity of soil is 120kN/m^2. Use M20 concrete and Fe 415 steel.   (20)

III.   Design the vertical wall of a cantilever type retaining wall for the following data :
        (i)   Unit weight of backfill = 19 kN/m^3
        (ii)   Back is in level with top of back fill and carries a live load surcharge
                of 18.5kN/m^2.
        (iii)   Angle of repose of back fill = 30^0
        (iv)   Coefficient friction between concrete and soil = 0.5
        (v)   Safe bearing capacity of soil = 250kN/m^2
        (vi)   Materials : M20 concrete and Fe 415 steel
        Also check for stability and safety of structure.   (20)

OR

IV.   What is a counterfort retaining wall? Explain the design of components of counterfort
        retaining wall.   (20)

V.   A reinforced concrete tank is 6m x 3m with a maximum depth of 2.5m of water. The
        tank rests on ground. Design the tank. Use M20 concrete and Fe 415 steel.   (20)

OR

VI.   Design a circular water tank to hold 500m^3 of water for the following data :
        (i)   Depth of water   = 3m
        (ii)   Tank rests on ground
        (iii)   The walls and base slab are not monolithic with each other
        (iv)   Materials : M25 concrete and Fe 415 steel.
        Draw a neat sketch showing reinforcements in the c/s of water tank.   (20)

VII.   Design a simple slab bridge for the following data :
        (i)   Clear span   = 5.5m
        (ii)   Clear width of carriage way = 6.8 m
        (iii)   Live load :   Class A loading
        (iv)   Materials :   Fe 415 steel and M 20 concrete.   (20)

OR

VIII.   Design the interior slab panel of a T-beam slab bridge for the following requirements.
        (i)   Two lane traffic of IRC class A loading
        (ii)   Effective span = 12m
        (iii)   Thickness of wearing coat = 80mm
        (iv)   Width of carriage way   =   6.8m   (20)

IX.   (a)   What is prestressing? Explain the importance of using high-strength concrete in
               prestressed concrete.   (8)
        (b)   Explain with examples pre-tensioning and post-tensioning.   (12)

OR

X.   (a)   Explain why high tensile steel wires are used in prestressed concrete structures. (8)
        (b)   A straight post-tensioned concrete member 15m long with a cross-section of 300mm x
               500mm is prestressed with 900mm^2 of high tensile wires. There are four tendons each
               of 225mm^2. The tendons are tensioned to a stress of 1050N/mm^2. Determine the loss
               of prestress in each tendon due to elastic shortening of concrete. Also find average
               loss of prestress. Also state to what stress each tendon to be tensioned so that a
               constant stress of 1050N/mm^2 is maintained in the member.   (12)

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