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ET-508(A)

00585

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2012

ET-508(A) : STRUCTURAL DESIGN-I

Time : 3 hours *Maximum Marks : 70*

*Note : Attempt **any four** questions. All questions carry **equal** marks. Use of code of practice **IS-456** and **calculators** is allowed. Any missing data may be suitably assumed.*

1. Determine the ultimate moment of resistance of the doubly reinforced beam section of given data : **17½**

   $b = 300$ mm, $d = 550$ mm, $A_{st} = 3054$ mm^2, $f_y = 415$ MPa and $f_{ck} = 20$ MPa, $d' = 50$mm, $A_{sc} = 982$ mm^2

2. A rectangular reinforced concrete beam, located inside a building in a coastal town, is simply supported on two masonry walls 230 mm thick and 6 m apart (centre to centre). The beam has to carry, in addition to its own weight, a distributed live load of 10 kN/m and a dead load of 5 kN/m. Design the beam section for maximum moment. Assume M20 grade concrete and Fe 415 steel. **17½**

3. Design a one - way slab, with a clear span of 5m, simply supported on 230 mm thick masonry walls, and subjected to a live load of 3kN/m^2 and a surface finish load of 1 kN/m^2, using Fe 415 steel. Assume that the beam is subjected to (a) mild exposure, and (b) very severe exposure, and compare the results. **17½**

4. Design the reinforcement in a column of size 450 mm × 600 mm, subject to an axial load of 2000 kN under service dead and live loads : The column has an unsupported length of 3.0 m and is braced against sideway in both directions. Use M20 concrete and Fe 415 steel. **17½**

5. Design a circular roof slab of inside dia 6.625 m, supported on brickwall of 375 for following data : **17½**

   Roof slab thickness = 200 mm

   Lime concrete thickness = 150 mm

   Live load on roof = 0.75 kN/m^2

   use M20 concrete and Fe415 steel.

6. Design a suitable counterfort retaining wall to support a level backfill, 7.5 m high above the ground level on the toe side. Assume good soil for foundation at a depth of 1.5 m below the ground level with a safe bearing capacity of 170 kN/m^2. **17½**

Further assume the back fill to comprise granular soil with a unit weight of 16 kN/m^3 and an angle of shearing resistance of 30°. Assume the coefficient of friction between soil and concrete to be 0.5. Use M25 concrete and Fe415 steel.
