No. of Printed Pages : 3

BAR-044

BACHELOR OF ARCHITECTURE (BARCH)

Term-End Examination

December, 2013

BAR-044 : THEORY OF STRUCTURES-V

Time : 3 hours *Maximum Marks : 70*

*Note : Attempt **any four** questions. All questions carry **equal** marks. Use of calculator and IS 456 code is **permitted**.*

1. Determine the neutral axis depth x_u (at the 17½ ultimate limit state) for the beam section given below in figure - 1.

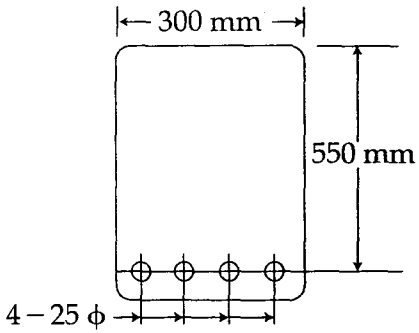

Figure - 1

Assume M20 concrete and Fe415 steel for the beam.

2. Determine the ultimate moment of resistance of the beam section shown in figure - 2. Assume M20 concrete and Fe415 steel. **17½**

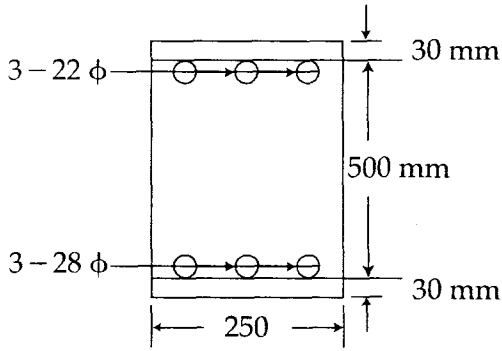

Figure - 2

3. Design a roof slab simply supported on all its four edges. The slab has a size of effective spans 4m × 9m. Imposed load may be taken as $2 kN/m^2$. Take M20 grade concrete and Fe415 steel. **17½**

4. Design the reinforcement in a column of size 450mm × 600mm, subjected to an axial load of 2000 kN under service dead and live loads. The column has an unsupported length of 3m and is braced against sidesway in both directions. Use M20 concrete and Fe415 steel. **17½**

5. A simply supported beam with a clear span of 6m, width of 400 mm and effective depth of 560 mm carries a factored load of 175 kN/m (including self weight dead load and live load). It is reinforced with 4 bars of 28 mm diameter tension steel which continue right into the support take f_{ck} as 20 N/mm^2 and f_y as 415 N/mm^2. Design shear reinforcement for the beam. **17½**

6. Design an isolated footing for a square column of size 450mm × 450mm. The column is reinforced with $8-25\Phi$ bars and carries a service load of 2300kN. Assume soil with safe bearing capacity of $300kN/m^2$ at a depth of 1.5m below ground. Assume M_{20} grade concrete, Fe415 steel for the footing. 17½

7. Write short notes on the following topics.

   (a) Design considerations for earthquake resistant design. 6

   (b) Punching shear. 6

   (c) Doubly reinforced beam sections. 5½