

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014****Subject code: 1722002****Date: 03-12-2014****Subject Name: Advanced Concrete Structures****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions
2. Make suitable assumptions wherever necessary
3. Figures to the right indicate full marks
4. Use of IS 875 part III, IS 456, IS 1893, IS 13920, SP 16, IS 3370 are permitted
5. Use M20 grade of concrete and Fe 415 steel if not given anywhere
6. Draw neat sketch if required
7. Consider unit weight of concrete 25 kN/m³ and Masonry 20 kN/m³ if required.

- Q.1 (a)** Calculate wind forces on interior frame of multistory frame clad building along the length of building according to IS 875, Part III. The building is located in city-center of Vadodara. Take dimensions of building as follows. **14**

Length: 45 m

Width: 22.5 m

Height: 60 m

Height of each storey: 5 m

Spacing of frame: 4.5 m in both direction.

Also calculate the bending moment in any interior column at ground storey due to calculated wind load using any approximate method.

- Q.2 (a)** A folded plate floor has all plates making an angle of 45 degrees with horizontal and casted so that vertical depth of folded plate is 0.8 m. Design reinforcement in plate to carry L.L = 2.5 kN/m². Assume plate thickness 110 mm and simply supported span of 12 m. Use M20 concrete and Fe 415 steel. **07**

- (b)** Design a conical roof over a 12 meter diameter hall with a rise of 4 meter. Assume L.L=2.0 kN/m². Use M20 concrete and Fe 415 steel. The dome is supported on 230 mm wide continuous support on periphery. **07**

OR

- (b)** Explain in brief in context to earthquake engineering **07**
- 1) Torsionally coupled and Torsionally uncoupled buildings
 - 2) Strong column weak beam concept

- Q.3** Fix the basic dimensions of Intze type container of an elevated water tank to store 10 lacs liter of water. Design and provide the reinforcement detailing of 1. Top Dome 2. Top Ring beam 3. Cylindrical Tank wall 4. Bottom Ring Beam. Use M20 concrete and Fe 415 steel. **14**

Also sketch the suitable supporting system for the designed Intze water tank.

OR

- Q.3** Design and detail an interior flat slab panel having c/c dimension of 7 m X 7 m. The flat slab is rested on square column of dimensions 500 mm X 500 mm without drop or column head. Take storey height = 4 m, floor finish = 1 kN/m², live load = 4 kN/m². Use M20 concrete and Fe415 grade steel. **14**

- Q.4** Design a combined footing for columns C₁-C₂-C₃ spaced 4.5 m c/c. The characteristic load on C₁, C₂ and C₃ are 1100 kN, 1200 kN and 1100 kN, respectively. Width of footing is restricted to 2.0 m. The columns are 400 mm x 400 mm each. The safe bearing capacity of soil is 180 kN/m². The **14**

materials are M20 concrete and Fe 415 steel

OR

- Q.4 (a)** Design a raft foundation of total size 16 m x 16 m including a projection of 0.5 m along all four sides beyond the centre of columns. The raft supports 16 columns with 5.0 m spacing in both directions. Each peripheral and interior column carries a load of 500 kN and 1000 kN at service state, respectively. Net bearing capacity of soil is 80 kN/m². The column size is 350 mm x 350 mm. Use M20 concrete and Fe 415 steel. **14**

- Q.5** Design a pile cap for supporting a column of section 450 mm x 450 mm carrying a factored axial load of 2000 kN and a factored moment of 400 kN-m. The pile cap contains a group of 4 friction piles each of 500 mm diameter for transfer of loads from column to soil. Use M20 concrete and Fe415 steel **14**

OR

- Q.5** A grid floor has slab 125 mm thick, floor finish =1 kN/m², live load = 3 kN/m² is provided for a hall with overall dimensions of 18 m x 18 m c/c with wall on outer periphery only and 5 beams of 18 m long to form slab panels of size 3m x 3m. Assume all beams of size 350 x 1100 mm (excluding slab depth). Design and detail the reinforcement in central beam of 18 m long using any method of design. **14**

