Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 1722002 **Date:13/05/2015**

Subject Name: Advanced Concrete Structures

Time: 02:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Assume concrete grade M20 & Fe 415 steel grade unless otherwise mentioned.**
5. **Use of IS 456, SP 16, IS 875, IS 3370 & IS 1893 are permitted.**

Q.1 Design a raft foundation of total size 22 m x 13 m including a projection of 0.5 m along all four sides beyond the centre of columns. The raft supports 12 columns with 7 m spacing along length (22 m) and 6 m spacing along breadth (13 m). Each peripheral and interior column carries a factored load of 800 kN and 1500 kN, respectively. Net bearing capacity of soil is 75 kN/m^2. The column size is 300 mm x 300 mm. Use M20 concrete and Fe 415 steel. **14**

Q.2 (a) A spherical dome, without opening, has 13 m span, 2.5 m central rise and 150 mm thickness. The floor finish load is 1 kN/ m^2 and no live load. Design the bottom ring beam of 350 mm width and supported throughout with masonry wall. **07**

(b) Define the terms: (1) Response reduction factor, (2) Time period of building, (3) Centre of stiffness, (4) Centre of mass, (5) Base shear, (6) Accidental eccentricity and (7) Seismic weight. **07**

OR

(b) A coffered floor system for a hall with over all dimensions 10 m x 10 m is provided by beams of size 150 mm x 750 mm, excluding slab, at 2 m centre to centre along both directions. All beams have bottom bars 4-20mm dia., top bars 2-20 mm dia. Consider slab thickness 110 mm and floor finish 1 kN/m^2. Calculate the maximum safe working live load on slab using IS 456 method. **07**

Q.3 (a) Design reinforcement in a folded plat roof having all plates making an angle of 45^0 with horizontal and casted so that vertical depth is 900 mm. The thickness and simply supported span of the plate is 100 mm 10 m, respectively. Consider live load of 3 kN/m^2. **07**

(b) Design the reinforcement in supporting shaft of an Intze water tank having 2000 mm internal diameter and 150 mm thickness. The shaft carries an axial load of 5000 kN and bending moment of 700 kN-m at service condition for dead and wind load combination. **07**

OR

Q.3 Design a pile cap for supporting a column of section 450 mm x 450 mm carrying an axial load of 1800 kN and a uniform moment of 350 kN-m at service state. 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**

Q.4 A multi-storied building having 30 m x 30 m plan dimensions with columns spaced at 5 m c/c in both directions is to be designed. The height of building is 30 m with 3 m story height and is situated at Surat in developed out-skirt area with scattered buildings of its height. Determine the design wind pressure acting on the building and draw the pressure diagram. **14**

OR

Q.4 A grid floor system is provided for hall of overall dimensions 9 m (3 m - 3 nos.) x 15 m (3 m - 5 nos.), forming slab panels of size 3m x 3m. Assume all 9 m long beams of size 230 mm x 750 mm (excluding slab) and all15 m long beams of size 230 x 800 mm (excluding slab) provided as per slab panels. Design the most critical 9 m long beam using approximate method, if slab thickness is 100 mm, floor finish is kN/m^2. Live load is 4 kN/m^2 **14**

Q.5 (a) Design an interior panel of a flat slab with drop and column heads. The centre to centre dimension of a typical slab panel is 5m x 5m. The story height is 3 m. Consider live load as 4 kN/m^2. The materials are M20 concrete and Fe415 steel. The size of column is 400 mm x 400 mm. Do not check the flat slab for shear. Sketch reinforcement details. **14**

OR

Q.5 (a) Design a combined footing for columns C_1-C_2-C_3 spaced 4m c/c. The characteristic load on C_1, C_2 and C_3 are 1200 kN, 1000 kN and 1200 kN, respectively. Width of footing is restricted to 2 m. The columns are 300 mm x 300 mm each. The materials are M20 concrete and Fe 415 steel. The safe bearing capacity of soil is 175 kN/m^2. **14**

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