Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(Old course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 1722002 **Date: 10/12/2015**

Subject Name: ADVANCED CONCRETE STRUCTURES

Time:2:30 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. **Use of IS 875 part III, IS 456, IS 1893, IS13920, SP 16, IS 3370 are permitted**
5. **Use M20 grade of concrete and Fe 415 steel if not given any where**
6. **Draw neat sketch if required**
7. **Unit weight of RCC = 25 kN/m^3 and Masonry = 20 kN/m^3**

Q.1 **(a)** A Grid Floor has slab thickness of 125 mm which carries L.L= 3.5 kN/m^2 and F.F=1.0 kN/m^2, is provided for a hall of 15 meter x 15 meter with wall on outer periphery and 5 beams of 15 meter span in either direction to form slab panel of 2.5 m x 2.5 m. Consider size of beam as 230 mm x 1200 mm (including slab depth). Calculate the bending moment, torsional moment and shear force at a beam junction at center of hall, also design reinforcement in central beam of 15 meter span for reinforcement. Use any method. Give reinforcement detail also. **14**

Q.2 **(a)** A column of size 400 x 400 mm carrying Pu = 1750 kN, Mux = 250 kNm, Muy = 50 kNm is supported by a pile cap 900 mm effective thickness resting on 4 piles (of 500 mm Diameter each) at 1500 mm c/c. Design the reinforcement in pile cap and calculate maximum pile load. **07**

(b) A spherical dome having a span of 12 m central rise of 2 m has no opening and has thickness of 175 mm, floor finish 1 kN/m^2 and live load 2.5 kN/m^2. Design bottom ring beam of 300 mm width and supported through out with masonry wall. **07**

OR

(b) A folded plate floor has all plates making an angle of 60 degrees with horizontal and casted so that vertical depth of folded plate is 1.6 m. Design reinforcement in plate to carry L.L = 2 kN/m^2. Assume plate thickness 125 mm and simply supported span of 21 m. **07**

Q.3 A combined footing is provided for 3 columns C_A ï 2.1 m c/c - C_B ï 2.8 m c/c - C_c. Assume C_A = 350 X 550 mm (along length), C_B = 400 mm diameter, C_c = 550 X 350 mm (along width), Pu_A = 2600 kN, Pu_B = 2200 kN, Pu_C = 2200 kN. Calculate the length, analyze and design the footing beam if the minimum projection of the beam beyond column center is 1 m, footing width is 3.25 meter and SBC of soil is 200 kN/m^2. **14**

OR

Q.3 A flat slab 220 mm thick with floor finish 1 kN/m^2, live load 4 kN/m^2 is supported at 6 m x 6 m c/c by columns of size 500 mm diameter. Check the slab for shear and design reinforcement, and sketch the reinforcement. No need to check for pattern loading. Use direct design method. **14**

Q.4 A circular water tank has outer cylindrical wall 10 m diameters, 4.5 m high, supporting shaft 2.5 m diameter. Design the top dome and top ring beam. Use M25 concrete grade. **14**

OR

Q.4 (a) Design a conical roof over a 10 meter diameter hall with a rise of 2 meter. Assume L.L=1.5 kN/m^2. The dome is supported on 450 mm wide continuous support on periphery. **07**

(b) Design a circular water tank rested on Ground having 12.5 m internal diameter and 4.5 m high fixed at base and free at top. **07**

Q.5 An eight storeyed building in AHMEDABAD on plane ground has 4 bays of 5m in length and 4 bays of 4m in width. Height of each storey is 3.2m. height of plinth is am and depth of foundation 2 m. Plot wind pressure diagram and compute nodal force at storey level, as per provisions of to IS: 875(part- III). **14**

OR

Q.5 A four storied square RC framed building of size 36 meter x 36 meter has 49 columns spaced at 6 m x 6 m c/c in both direction with live load 4 kN/m2 is to be constructed in Surat. Work out seismic forces on the structure by seismic coefficient method using IS 1893. All beams and columns size 300mm x 500 mm. Thickness of roof and floor slab 120 mm thick. Wall is of 150 mm thick all around. Height of each floor 3m. **14**

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