Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (OLD) – • EXAMINATION – SUMMER 2016

Subject Code: 1722002 Date:18/05/2016

Subject Name: Advanced Concrete Structures

Time:10:30 am to 01:00 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 are permitted**
5. **Use M20 grade of concrete and Fe 415 steel in not given any where**

Q.1 **(a)** Design a conical roof over a 10m diameter hall with a rise of 2.8m. Assume L.L= 1.5 kN/m^2. The dome is supported on 400 mm wide continuous support on periphery. **07**

(b) A column of size 450 mm x 450 mm carrying Pu =1200 kN, Mux= 200 kNm, Muy = 80 kNm is supported by a pile cap 900 mm thick resting on 4 piles (of 300 mm Diameter each) at 1350 mm c/c. Design the reinforcement in piles cap end check the cap shear. Also calculate maximum pile load. **07**

Q.2 **(a)** Design a circular water tank rested on Ground having 12 m internal diameter and 4.5 m high fixed at base and free at top. Use M20 grade of concrete and Fe 415 steel. **07**

(b) A folded plate floor has all plates making an angle of 60^0 with horizontal and casted so that vertical depth of folded plate is 1.45 meter. Design reinforcement in plate to carry L.L = 2.5 kN/m^2. Assume plate thickness 130 mm and simply supported span of 20 meter. Use M20 and Fe 415. **07**

OR

(b) A spherical dome having a span of 20 m central rise of 4.5 m has no opening and has thickness of 225 mm, floor finish 1 kN/m^2, live load 2 kN/m^2. Design bottom ring beam of 300 mm width and supported through out with masonry wall. Also calculate the stresses in dome at mid height. **07**

Q.3 A building of size 20 m x 20 m has 25 columns of size 400 mm x 400 mm, spaced at 5 m c/c. Assume 230 mm thick brick masonry wall on periphery only and no internal walls. The building has 5 stories of 3.2 m each. The plinth level of RCC slab and beam is at 1.0 meter above G.L and footing is provided at 1.8 meter below G.L. Consider beam size 230 mm x 550 mm in both direction and slab thickness 140 mm. Consider L.L = 4 kN/m^2 and F.F = 1.0 kN/m^2. The building is located in Rajkot. Calculate wind forces on any one internal frame using IS 875. **14**

OR

Q.3 For the data given in Q.3 above, calculate Earthquake forces on any one internal frame using IS 1893. **14**

Q.4 Design an Intze type over head water tank of 10 lacs litres capacity. Using M20 and Fe 415, Design **14**

1. Top Dome
2. Top Ring beam
3. Cylindrical Tank wall
4. Bottom Ring Beam

OR

Q.4 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 12 meter x 12 meter with wall on outer periphery and 5 beams of 12 meter span in either direction to form slab panel of 2 m x 2 m. Consider size of beam as 300 mm x 1300 mm (including slab depth). Design central beam of 18 meter span for reinforcement. **14**

Q.5 A combined footing is provided for 3 columns C_A – 2.0 m c/c - C_B – 2.0 m c/c - C_c. Assume C_A = 300 X 550 mm (along length), C_B = 450 mm diameter, C_c = 600 X 300 mm (along length), Pu_A = 2000 kN, Pu_B = 1500 kN, Pu_C = 3000 kN. Calculate the length and analyze the footing beam if the minimum projection of the beam beyond column center is 1m, footing width is 3.5m and SBC of soil is 180 kN/m^2. **14**

OR

Q.5 Design an interior FLAT slab panel having c/c dimension of 6 x 6 m. The flat slab is rested on circular column RCC having diameter 500 mm. Consider that Drops and Column heads are provided. Consider L.L = 5 kN/m^2 and F.F=1.0 kN/m^2. Use M20 and Fe 415. Do not check the flat slab for shear. Sketch the design output details. Use direct design method. **14**

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