Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1722002 **Date: 09/07/2012**

Subject Name: Advanced Concrete Structure

Time: 10:30 am – 13:00 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)** A slab beam type combined footing is required under two columns which are 5 meter c/c and carries limit state load of 1200 kN each. Consider S.B.C of soil 180 kN/m^2 and width of footing 1.2 meter. The size of columns are 450 mm x 450 mm. Design combined footing using M20 and Fe 415 **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 1.5 meter. Design reinforcement in plate to carry L.L = 2 kN/m^2. Assume plate thickness 125 mm and simply supported span of 20 meter. Use M20 and Fe 415 **07**

Q.2 **(a)** A column of size 500 mm x 500 mm carrying Pu =1500 kN, Mux= 180 kNm,
Muy = 60 kNm is supported by a pile cap 900 mm thick resting on 4 piles (of 300 mm Diameter each) at 1500 mm c/c. Design the reinforcement in piles cap end check the cap shear. Also calculate maximum pile load. **07**

(b) A spherical dome having a span of 16 m central rise of 4 m has no opening and has thickness of 200 mm, floor finish 1 kN/m^2, live load 2 kN/m^2. Design bottom ring beam of 250 mm width and supported through out with masonry wall. Also calculate the stresses in dome at mid height. **07**

OR

(b) Design a conical roof over a 12 meter diameter hall with a rise of 2.5 meter. Assume L.L= 2.0 kN/m^2. The dome is supported on 450 mm wide continuous support on periphery. **07**

Q.3 Design an interior FLAT slab panel having c/c dimension of 7.5 x 7.5 m. The flat slab is rested on circular column RCC having diameter 600 mm. Consider that Drops and Column heads are provided. Consider L.L = 5 kN/m2 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. **14**

OR

Q.3 A Grid Floor has slab thickness of 120 mm which carries L.L= 3 kN/m^2 and F.F=1.0 kN/m^2, is provided for a hall of 18 meter x 18 meter with wall on outer periphery and 5 beams of 16 meter span in either direction to form slab panel of 3 m x 3 m. Consider size of beam as 350 mm x 1200 mm (including slab depth). Design central beam of 18 meter span for reinforcement. **14**

Q.4 A building of size 20 m x 20 m has 25 columns of size 450 mm x 450 mm, spaced at 5 m c/c. Assume 230 mm thick brick masonry wall on periphery **14**

only and no internal walls. The building has 5 stories of 4 m each. The plinth level of RCC slab and beam is at 1.0 meter above G.L and footing is provided at 2 meter below G.L. Consider beam size 230 mm x 600 mm in both direction and slab thickness 150 mm. Consider L.L = 4 kN/m^2 and F.F = 1.0 kN/m^2. The building is located in Vadodara. Calculate wind forces on any one internal frame using IS 875.

OR

Q.4		For the data given in Q.4 above, calculate Earthquake forces on any one internal frame using IS 1893.	**14**
Q.5	**(a)**	Design a circular water tank rested on Ground having 10 meter internal diameter and 6 meter high fixed at base and free at top. Use M20 and Fe 415	**10**
Q.5	**(b)**	Explain the following terms in earthquake engineering 1) Response reduction factor 2) Accidental eccentricity 3) Centre of stiffness 4) Time period of building	**04**

OR

Q.5		Design an Intze type over head water tank of 8 lacs litres capacity. Using M20 and Fe 415, Design 1. Top Dome 2. Top Ring beam 3. Cylindrical Tank wall 4. Bottom Ring Beam	**14**

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