Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1722002 Date: 31-12-2012

Subject Name: Advanced Concrete Structures

Time: 10.30 am – 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. **Assume concrete grade M20 & Fe 415 steel unless otherwise mentioned.**
5. **Use of IS-456, SP-16, IS-875 permitted in the examination hall.**

Q.1 **(a)** A folded plate floor has all plates 120 mm thick and making an angle of 45 degrees with horizontal and casted so that vertical depth of folded plate is 750 mm. Design reinforcement in plate to carry live load 2 kN/m^2 if it has a simply supported span of 9 m. **07**

(b) A raft foundation of total size 12 m X 12 m is provided for 9 columns with 5 m c/c spacing along each direction. Assume working load on interior column as 2100 kN & on all other columns as 1200 kN. Analyze the interior beam. **07**

Q.2 **(a)** A Coffered/Grid floor system is provided for hall with overall dimensions 12 m X 15 m and provided by beams of size 150 x 1000 mm (excluding slab) provided at 3000 mm c/c along both directions. Assume slab thickness of 100 mm, floor finish of 1.0 kN/m^2 , live load of 4.0 kN/m^2, and calculate the maximum bending moment in central beam 12 m long. Use any method. **07**

(b) A spherical dome has span of 20 m & central rise of 4 m with an opening of 3.5 m horizontal diameter. .Assume slab 100 mm thick, floor finish 1.5 kN/m^2 , no live load & no lantern load and design top ring beam (150 mm X 300 mm) at opening. **07**

OR

(b) The supporting shaft of an Intze water tank is 4000 mm internal diameter and 200 mm thick, is reinforced by vertical bars on each face of 12 mm diameter at 120 mm c/c and horizontal bars on each face of 10 mm diameter at 200 mm c/c. Check the safety of the shaft for combination of working axial load of 6000 kN & working bending moment 3000 kNm for dead & wind load combination. **07**

Q.3 A flat slab 175 mm thick with floor finish 1 kN/m^2, live load 3 kN/m^2 is supported at 5.0 m X 6.0 m c/c by columns of size 400 mm diameter, circular column heads of 600 mm depth below slab and diameter ranging from 600 mm at bottom to 1700 mm at top, no slab drops provided. Check the slab for shear and design reinforcement in column strip along long span. **14**

OR

Q.3 A combined footing of size 2.7 m X 6.2 m is provided for columns as shown in figure 1. Assume C_A = 300 X 600 mm, C_B = 380 mm diameter, C_c = 230 X 750 mm, PuA = 2100 kN, PuB = 1800 kN, PuC = 1500 kN. **14**

Analyze the footing beam for bending moment , shear force and torsional moment.

Q.4 A short RCC Column having concrete grade M25, size 300 X 600 mm, main steel 12 nos 20 mm diameter bars is subjected to a factored axial load of 1200 kN, factored bending moment about stronger axis of 2M kNm & factored bending **14**

moment about weaker axis of M kNm. Calculate the maximum value of M.

OR

Q.4 A column of size 300 X 450 mm carrying Pu = 2000 kN, Mux= 150 kNm, Muy= 80 kNm is supported by a pile cap 1000 mm thick resting on 4 piles (of 300 mm Diameter each) at 1800 mm c/c. Design the reinforcement in pile cap and calculate maximum pile load. **14**

Q.5 A circular water tank with flexible base, 9 m diameter and 6 m height has vertical walls 180 mm thick. Assume steel grade Fy 415, concrete grade M25, and Design the reinforcement in the vertical walls with curtailment at every 2 m. Also check the suitability of wall thickness. **14**

OR

Q.5 A building of size 10 m X 10 m has 9 columns spaced at 5 m X 5 m c/c and has 3 stories of 3.6 m height each. Assume 35 percent openings in walls and calculate wind load on an interior frame of the building when the wind blows along that direction. Also calculate the bending moment in the interior column at ground floor due to the said wind load. Assume the building to be located at sea shore in Mumbai. **14**

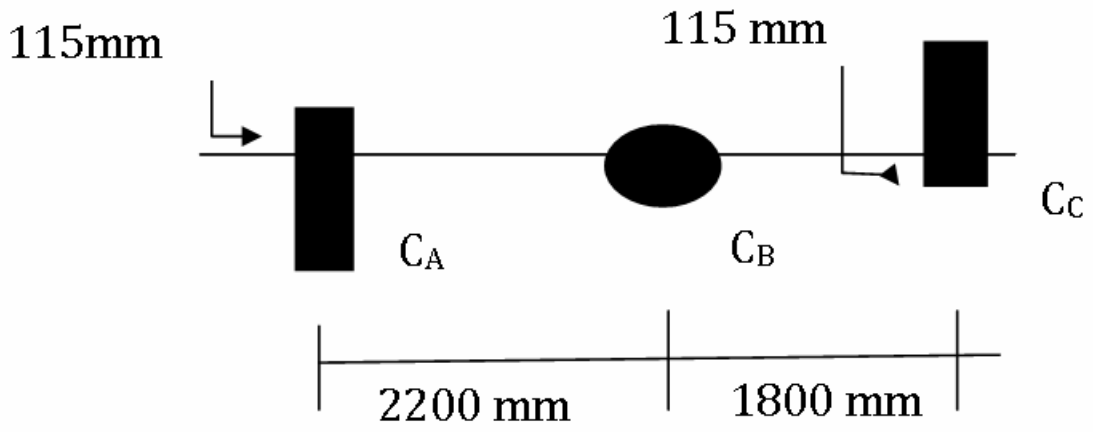

Fig -1 Ques- 3

****