

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. Sem. – IInd - Examination – June/July- 2011****Subject code: 1722002****Subject Name: Advanced Concrete Structures****Date: 24/06/2011****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary & mention same.
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 1893 permitted in the examination hall.

- Q.1 (a)** Explain the following terms in Earthquake Engineering **06**
- 1) Ductile Detailing of beams
 - 2) Torsion due to Eccentricity of EQ loads
 - 3) Advantages of Shear Wall

- (b)** A raft foundation of total size 12 m X 12 m is provided for 9 columns with 5 m c/c along each direction and 1 m projection of slab on all sides. Assume working load on interior column 3000 kN & on all other columns as 2000 kN. Analyze the interior beam. **08**

- Q.2 (a)** A folded plate floor has all plates 120 mm thick and making an angle of 60 degrees with horizontal and casted so that vertical depth of folded plate is 750 mm. Design reinforcement in plate to carry live load 3 kN/m² if it has a simply supported span of 10 m. **07**

- (b)** A Grid floor system is provided for hall with overall dimensions 12 m x 12 m and provided by beams of size 150 x 750 mm (excluding slab) provided at 2 m c/c along both directions. If all beams have bottom bars 4 nos-25 mm, top bars 2 nos-20 mm and slab thickness of 100 mm, floor finish of 1 kN/m². Calculate the maximum safe working live load on slab. Use IS-456 method. **07**

OR

- (b)** A circular water tank with flexible base, 8 m diameter and 8 m height is provided at ground level. The cylindrical wall provided is 180 mm thick. Design the reinforcement in wall at bottom level and check the suitability of the thickness. Assume steel grade Fy 415 and concrete grade M25. **07**

- Q.3** A building of size 16 m X 25 m has 30 columns spaced at 4 m X 5 m c/c and has 3 stories of 3 m each. Calculate wind load on interior frame along 16 m length of the building when the wind blows along that direction, and calculate the bending moment in any interior column at ground floor due to the said wind load. Assume the building to be located at Navarangpura, Ahmedabad. **14**

OR

- Q.3** A spherical dome has span of 15 m & central rise of 3 m with an opening of 2.5 m horizontal diameter. Assume slab 100 mm thick, floor finish 1 kN/m², no live load & lantern load of 200 kN and design bottom ring beam 230 mm wide. **14**

- Q.4** A combined footing is provided for 3 columns $C_A - 2 \text{ m c/c} - C_B - 1.7 \text{ m c/c} - C_C$. Assume $C_A = 230 \times 600 \text{ mm}$ (along length), $C_B = 380 \text{ mm}$ diameter, $C_C = 750 \times 230 \text{ mm}$ (along length), $P_uA = 2000 \text{ kN}$, $P_uB = 1500 \text{ kN}$, $P_uC = 2500 \text{ kN}$. **14**

Calculate the length and analyse the footing beam if the minimum projection of the beam beyond column center is 750 mm, footing width is 3 meter and SBC of soil is 230 kN/m^2 .

OR

- Q.4** A column of size $300 \times 450 \text{ mm}$ carrying $P_u = 1500 \text{ kN}$, $M_{ux} = 200 \text{ kNm}$, $M_{uy} = 50 \text{ kNm}$ is supported by a pile cap 1000 mm thick resting on 4 piles (of 400 mm Diameter each) at 1500 mm c/c. Design the reinforcement in pile cap and calculate maximum pile load. **14**

- Q.5** An intze water tank has outer cylindrical wall 8.5 m diameter, 4 m high, supporting shaft 3.5 m diameter, conical bottom slab (250 mm thick) at 45 degrees with horizontal. Design the conical bottom slab if conc grade is M25. **14**

OR

- Q.5** A flat slab 160 mm thick with floor finish 1 kN/m^2 , live load 4 kN/m^2 is supported at $5 \text{ m} \times 6 \text{ m}$ c/c by columns of size 300 mm diameter. The column heads are 600 mm depth below slab and size ranging from 1600 mm diameter at top to 450 mm diameter at bottom, no slab drops provided. Check the slab for shear and design reinforcement in column strip along long span, and sketch the reinforcement. **14**
