

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2013****Subject code: 1722002****Date: 27-12-2013****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. 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. Consider unit weight of concrete 25 kN/m^3 and Masonry 20 kN/m^3 if required.

- Q.1 (a)** A conical dome having a span of 20 m central rise of 3.5 m has thickness of 150 mm, floor finish 1 kN/m^2 , live load 1.5 kN/m^2 . Design bottom ring beam supported through out on masonry wall of 350 mm width. **07**
- (b)** Design a circular water tank with flexible base for capacity of 5,00,000 liters. The depth of water is to be 4 m and free board = 0.2 m. Use M25 grade concrete and Fe415 grade steel. **07**

- Q.2 (a)** A folded plate floor has all plates making an angle of 45° with horizontal and casted so that vertical depth of folded plate is 1.2 meter. Design reinforcement in plate to carry L.L = 2.5 kN/m^2 . Assume plate thickness 125 mm and simply supported span of 15 meter. Use M20 concrete and Fe 415 steel. **07**
- (b)** Explain in Brief **07**
- (i) Various types of structural systems for RC multistory buildings
 - (ii) Seismic design philosophy adopted by IS 1893

OR

- (b)** A column of size 400 x 600 mm is carrying $P_u = 1600 \text{ kN}$, $M_{ux} = 300 \text{ kNm}$ is supported by a pile cap 1000 mm thick resting on 4 piles (of 350 mm Diameter each) at 1400 mm c/c. Design the reinforcement in pile cap and calculate maximum pile load. **07**

- Q.3** A grid floor has 100 mm thick slab, floor finish $= 1 \text{ kN/m}^2$, live load 3.5 kN/m^2 is provided for a hall with overall dimensions of 18 m x 18 m c/c with wall on outer periphery only and 5 interior beams in both direction forming a slab panel of size 3m x 3m. Assume all beams of size 230 x 1000mm (including slab thickness). Calculate the bending moment, torsional moment and shear force at a beam junction of hall, also design reinforcement in central beam of 18 m long. Use any method. **14**

OR

- Q.3** A flat slab 160 mm thick with floor finish 1 kN/m^2 , live load 4 kN/m^2 is supported at 5 m X 5 m c/c by columns of size 300 mm diameter. The column heads are 500 mm depth below slab and size ranging from 1500 mm diameter at top to 500 mm diameter at bottom, no slab drops provided. Check the slab for shear and design reinforcement in column strip and sketch the reinforcement details. **14**

Q.4 A raft foundation of total size 14 m x 18 m is provided for 9 columns with 5 m c/c along one direction & 7m c/c along other direction and 2.0 m projection of slab on all sides. Assume working load on interior column 5500 kN & on all other columns 3000kN. Analyse the periphery beam of 18m long. **14**

OR

Q.4 (a) An Intze type over head water tank has following data **14**
(1) Diameter of top dome – 14 meter
(2) Rise of top dome – 2 meter
(3) Diameter of cylindrical portion – 14 meter
(4) Height of cylindrical portion – 7 meter
Using M20 and Fe 415, Design and provide the detailing of 1. Top Dome 2. Top Ring beam 3. Cylindrical Tank wall 4. Bottom Ring Beam.

Q.5 Calculate wind forces on interior frame of multistory frame building located in outskirts of Dehradun on a hill having slope of 9° using IS 875, part III: **14**
Length: 50 m
Width: 15 m
Height: 60 m
Height of each storey: 4 m
Spacing of frame : 5 m in both direction
Under what conditions are the dynamic effects of wind to be considered?

OR

Q.5 For a RCC framed (SMRF) hospital building, find the design lateral forces and its distribution along the height, using static co-efficient method. Consider following data. **14**
(i) Location : Gandhidham
(ii) Soil condition : Medium soil
(iii) Plan dimensions : 5 bays of 6 m each along X direction and 6 bays of 5 m each along Y direction
(iv) Elevation : 6 storey including Ground storey , each with 3.5 m floor height
(v) Columns : 400 x 400 mm all
(vi) Beams : 300 x 500 mm (Excluding slab thickness)
(vii) Slab : 150 mm thick RCC
(viii) Walls : outer 230 mm brick masonry, inner 150 mm brick masonry
(ix) Parapet walls : 230 mm thick 1 m ht. brick masonry.
(x) Percentage of damping: 10 %

What change in the lateral forces will occur, if this building is to be constructed using Steel frame?
