

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**PDDC - SEMESTER-VIII • EXAMINATION – Winter - 2016**

**Subject Code: X80602****Date: 26/10/2016****Subject Name: Structural Design - II****Time: 02.30 pm - 05.00 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:456, IS:875, IS:1893, IS:13920, IS:3370, SP:16 and SP:34 are permitted.
5. Use M20 grade concrete and Fe415 grade steel if not mentioned.

- Q.1 (a)** Determine wind load on any intermediate frame of a multistory building. Also, determine nodal forces at each floor level. Use following data: **14**
- Length of building = 50 m  
Width of building = 40 m  
Height of building = 31 m  
Storey height = 3 m  
Frame spacing = 5 m in both directions  
Location of building = Pune  
Upwind slope =  $10^\circ$   
Height of hill = 800 m  
Location of building on wind ward side from crest = 150 m
- Q.2 (a)** Explain different types of load to be consider while structural design as per Indian Standards. **07**
- (b)** Explain various types of retaining walls. **07**
- OR**
- (b)** Explain importance of weep holes and shear key in retaining walls. **07**
- Q.3 (a)** Prepare a typical structural lay out for G+3 storey building having 5 bays of 5 m in X direction and 5 bays of 4 m in Y-direction. Design a two way slab at a typical floor. Floor height = 3.0 m, floor finish load =  $1 \text{ kN/m}^2$  and live load =  $3 \text{ kN/m}^2$ . All exterior walls are of 230 mm thick and interior wall of 115 mm thick. Assume beam size of 230 mm X 450 mm. Draw neat sketch of reinforcement detailing. **14**
- OR**
- Q.3 (a)** Prepare a typical structural lay out for G+3 storey building having 5 bays of 5 m in X direction and 5 bays of 4 m in Y-direction. Design a typical continuous beam OR a typical column. Floor height = 3.0 m, floor finish load =  $1 \text{ kN/m}^2$  and live load =  $3 \text{ kN/m}^2$ . All exterior walls are of 230 mm thick and interior wall of 115 mm thick. Assume beam size of 230 mm X 450 mm. Draw neat sketch of reinforcement detailing. **14**
- Q.4 (a)** Fix the basic dimensions of various elements of the cantilever retaining wall of height 4 m. Angle of repose of soil is  $30^\circ$ . The safe bearing capacity of soil is  $180 \text{ kN/m}^2$  and unit weight of soil is  $18 \text{ kN/m}^3$ . Coefficient of friction between soil and concrete is 0.55. Provide the checks for stability of the retaining wall. Design the stem and heel of the retaining wall. **14**

**OR**

**Q.4 (a)** Calculate preliminary sizes of all the components of a counterfort type retaining wall to retain 7 m earth above ground level. Angle of repose of soil is  $30^\circ$ . The safe bearing capacity of soil is  $180 \text{ kN/m}^2$  and unit weight of soil is  $18 \text{ kN/m}^3$ . Coefficient of friction between soil and concrete is 0.55. Provide the checks for stability of the retaining wall. Design the intermediate counterfort of the retaining wall. **14**

**Q.5 (a)** Design a circular under-ground water tank with flexible base for a capacity of 5 lakh litres. Angle of repose of soil is  $30^\circ$ . Unit weight of soil is  $18 \text{ kN/m}^3$ . Use M30 and Fe415. **14**

**OR**

**Q.5 (a)** Design and detail top spherical dome and cylindrical wall of overhead circular water tank. Assume diameter of tank 10m and thickness of top dome as 100mm with  $1 \text{ kN/m}^2$  live load. Use M25 and Fe415. **14**

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