

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**PDDC - SEMESTER-VIII • EXAMINATION – WINTER • 2014**

**Subject Code: X 80602**

**Date: 01-12-2014**

**Subject Name: Structural Design - II**

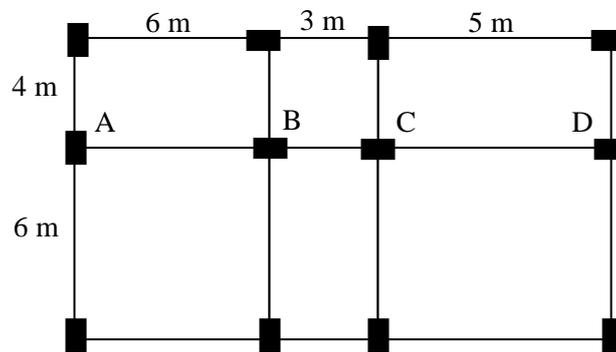
**Time: 02:30 pm - 05:00 pm**

**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 456:2000, IS 875 (Part I to V), IS 13920, IS 3370 (Part I to IV), SP -34 and SP-16 is allowed.
5. Use M-20 grade concrete and Fe-415 grade steel if not mentioned.

- Q.1** Fig. 1 shows typical floor plan (layout) of building. Find load (in terms of UDL) on beam A-B-C-D. Assume slab thickness of 110 mm, Floor finish of  $0.35 \text{ kN/m}^2$  and Live load of  $2.7 \text{ kN/m}^2$ . All exterior walls are of 230 mm thick and interior wall of 1150 mm thick. Assume beam size of 230 x 400 mm throughout. Show also load distribution diagram from slab to beam. **14**



- Q.2** (a) Explain detail guidelines for preparation of structural layout of buildings. **07**  
 (b) Explain Limit state method and working stress method in detail. **07**

**OR**

- (b) Draw neat ductile detailing sketch for beam column joint and footing as per codal provision. **07**

- Q.3** Estimate wind forces for a water tank for the following data. Total height of tank = 27 m, Which includes height of the supporting shaft=20 m , height of the bottom conical portion= 2m , height of cylindrical portion = 4 m and rise of top spherical dome= 1 m, diameter of supporting shaft= 4 m and diameter of cylindrical portion= 10 m, location is Ahmedabad, Terrain Category= II and class= B, Ground slope= 1 vertical to 7 horizontal, hill height= 280 m, location from crest 100 m windward, Design life 100 years. **14**

**OR**

- Q.3** Design and detail a slab type rectangular combined footing to support the columns carrying 1000 kN and 1300 kN at 4.0 m spacing. Their square column sizes are 400 mm and 450 mm respectively. The SBC of soil is 200 kPa and width of footing is 1.5 m. **14**

**Q.4** Design and detail following components of overhead circular water tank with flat bottom and supported on ring beam having water storage capacity of 3 lacs litre. (i) Top spherical dome (ii) Top ring beam (iii) Cylindrical wall. (iv) base slab. Use M-25 concrete and Fe 415 steel. **14**

**OR**

**Q.4** Design a RCC water tank of 6.0 m × 4.5 m with a maximum depth of 3.5 m of water using IS 3370 for fixed base condition. Use M20 concrete and Fe 415 grade of steel. **14**

**Q.5** Design a suitable cantilever type retaining wall to retain 5.5 m soil above ground level. The unit weight of backfill, angle of internal friction, coefficient of friction and soil bearing capacity are 18 kN/m<sup>3</sup>, 30°, 0.50 and 200 kPa respectively. **14**

**OR**

**Q.5** Design and detail stem and toe of counterfort retaining wall to retain 7.0 m height of earth above ground level using following data. **14**  
Angle of repose = 25°  
Unit weight of earth material = 18 kN/m<sup>3</sup>  
S.B.C. of earth = 160 kPa  
Coefficient of friction between the base and soil = 0.60  
Use M20 concrete and Fe 415 steel.

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