*Seat No.: _____* *Enrolment No._____*

# GUJARAT TECHNOLOGICAL UNIVERSITY

**PDDC - SEMESTER–VIII • EXAMINATION – SUMMER • 2014**

**Subject Code: X 80602** **Date: 29-05-2014**

**Subject Name: Structural Design - II**

**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 456:2000, IS 875 (Part I,II,II), IS 3370 (Part I,II,III,IV) 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 120 mm, Floor finish of 0.4 kN/m$^2$ and Live load of 2.5 kN/m$^2$. All exterior walls are of 230 mm thick and interior wall of1150 mm thick. Assume beam size of 230 x 400 mm throughout. Show also load distribution diagram from slab to beam. **14**

**Q.2 (a)** A rectangular beam 230 mm wide × 535 mm effective depth is subjected to a bending moment of 88.5 kNm at working loads. Find the steel area required. Use M15 and Fe415. **07**

**(b)** Discuss guideline for the preparation of structural layout. **07**

OR

**(b)** What do you mean by ductile detailing of structural member? Show ductile detailing for beam column joint and footing using figure as per IS. **07**

**Q.3** A 10 storied building having 8 bays at 3 m spacing in one direction and 4 bays at 4 m spacing in orthogonal direction is situated on a hill near Pune with upwind slope of 8°and factor S = 0.15. The storey height is 3.0 m along with 1.5 m parapet is provided at top. Showing the variation of wind pressure, calculate the nodal forces due to wind in both directions. **14**

OR

**Q.3** Design and detail a slab type rectangular combined footing to support the columns carrying 1100 kN and 1350 kN at 4.5 m spacing. Their square column sizes are 450 mm and 500 mm respectively. The SBC of soil is 225 kPa and width of footing is 1.6 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 5 lacs litre. (i) Top spherical dome (ii) Top ring beam (iii) Cylindrical wall. Use M-25 concrete and Fe 415 steel. **14**

OR

**Q.4** Design a rectangular RCC water tank of 6.5 m × 3.5 m with a maximum depth of 3.2 m of water. The tank rest on brick masonry walls all around, use M20 concrete and Fe 415 grade of steel. **14**

**Q.5** Design a suitable cantilever type retaining wall to retain 5 m soil above ground level. The unit weight of backfill, angle of internal friction, coefficient of friction and soil bearing capacity are 17 kN/m$^3$, 25°, 0.60 and 200 kPa respectively. **14**

OR

**Q.5** Design and detail stem and toe of counterfort retaining wall to retain 6.5 m height of earth above ground level using following data. **14**

Angle of repose = 30°

Unit weight of earth material = 17 kN/m$^3$

S.B.C. of earth = 150 kPa

Coefficient of friction between the base and soil = 0.62

Use M20 concrete and Fe 415 steel.

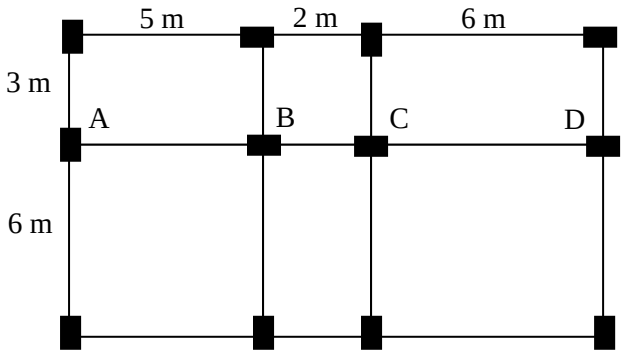


Fig. 1

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