

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII(NEW) • EXAMINATION – WINTER 2016

Subject Code: 2170607

Date: 21/11/2016

Subject Name: Design of Reinforced Concrete Structures

Time: 10.30 AM to 1.30 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Draw neat and clean figures with pencil only, whenever required.
5. IS 456, IS 3370, IS 875 Part I, Part II and Part III, SP 16, IS 1893, IS 1343, IS 13920 are permitted.
6. Use M20 grade of concrete and Fe415 grade of steel, until otherwise stated.

- Q.1** Perform the stability checks of cantilever retaining wall and design a heel and perform necessary checks for the following data. **14**
Height of wall = 4 m, Unit weight of soil = 17 kN/m^3 , Angle of internal friction = 30° , Safe bearing capacity = 150 kN/m^2 , Coefficient of friction between base and soil = 0.55. The top surface is horizontal behind the wall.
Height of stem = 4.65m, Thickness of stem = 200 mm at top and 350 mm at bottom. Base width = 2700 mm, Width of toe = 900 mm, Width of heel = 1450 mm, Thickness of base width = 350 mm, Depth of foundation = 1 m, size of key = 350 x 550 mm
- Q.2 (a)** For a given typical floor plan of a building (Figure 1), Estimate the load on the beam $B_1B_2B_3B_4$. All internal wall are of size 150 mm and all external peripheral walls are of size 250 mm. Assume beam size 250 x 600 mm. All columns are of size 300 x 600 mm. The slab thickness is of 140 mm. Live load for floor is 4 kN/m^2 and floor finish is of 1.5 kN/m^2 . Effective height of floor is 4 m. Unit weight of brick masonry work = 20 kN/m^3 . **07**
- (b)** Elaborate the limitations of direct design method used for flat slab. **07**
- OR**
- (b)** Explain the check for one way shear and two way shear for flat slab with codal provisions. **07**
- Q.3** Design and detail the beam $B_1B_2B_3B_4$, (figure 1) for flexure and shear. A beam SB1 is a secondary beam. **14**
- OR**
- Q.3** A multistoried braced G+6 important building of 30 m height is having a plan dimension 20m x 30m, having bay width 5 m in both direction. The ground floor height is 5 m and all other floor height is 4m. Parapet height is 1m. The building is located at “Vadodara” under the terrain category III. The upwind slope is less than 3° , Estimate the wind loads acting on internal frame at nodal points. Assume the depth of foundation is 2 m, depth of beam is 500 mm and ground beam is located at 0.50 m below ground level. **14**
- Q.4** Design a top dome and cylindrical wall of intze tank for 1000000 litres with following data. **14**
Height of staging = 18 m upto bottom of tank
Wind load = 1.5 kN/m^2 throughout of height
SBC of soil = 235 kN/m^2 at 2.8 m depth
- OR**

Q.4 Design a circular underground water tank for 5 lacs litres capacity with flexible base. Unit weight of soil is 17 kN/m^3 and angle of internal friction is 30° . Use M30 grade of concrete. **14**

Q.5 (a) Explain the philosophy of earthquake resistant design of structures. **07**
(b) Make critical remarks on "Effect of irregularities on performance of RC building". **07**

OR

Q.5 (a) Draw and detail for reinforcement for two span RC continuous beam of size $300 \times 450 \text{ mm}$ as per IS 13920. **07**
(b) Classify the methods of improving ductility in a structure. **07**

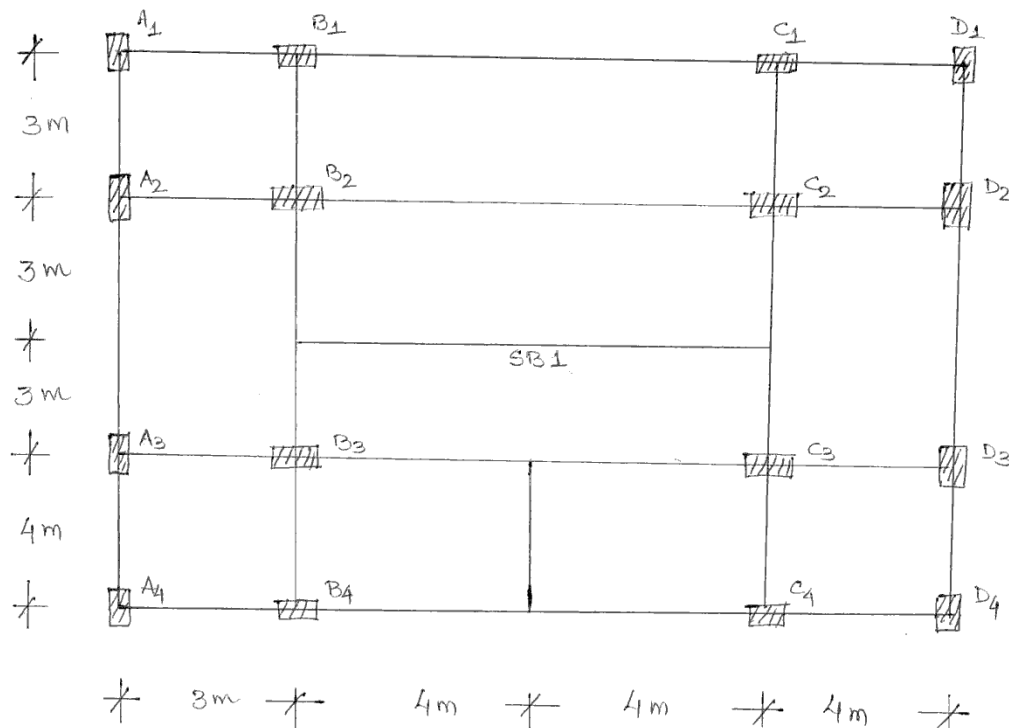


Figure 1 (Q.2(a)) and (Q.3)