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 = 30^0, 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 3^0, 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 30^0. 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 x 450 mm as per IS 13920.	**07**
	(b)	Classify the methods of improving ductility in a structure.	**07**

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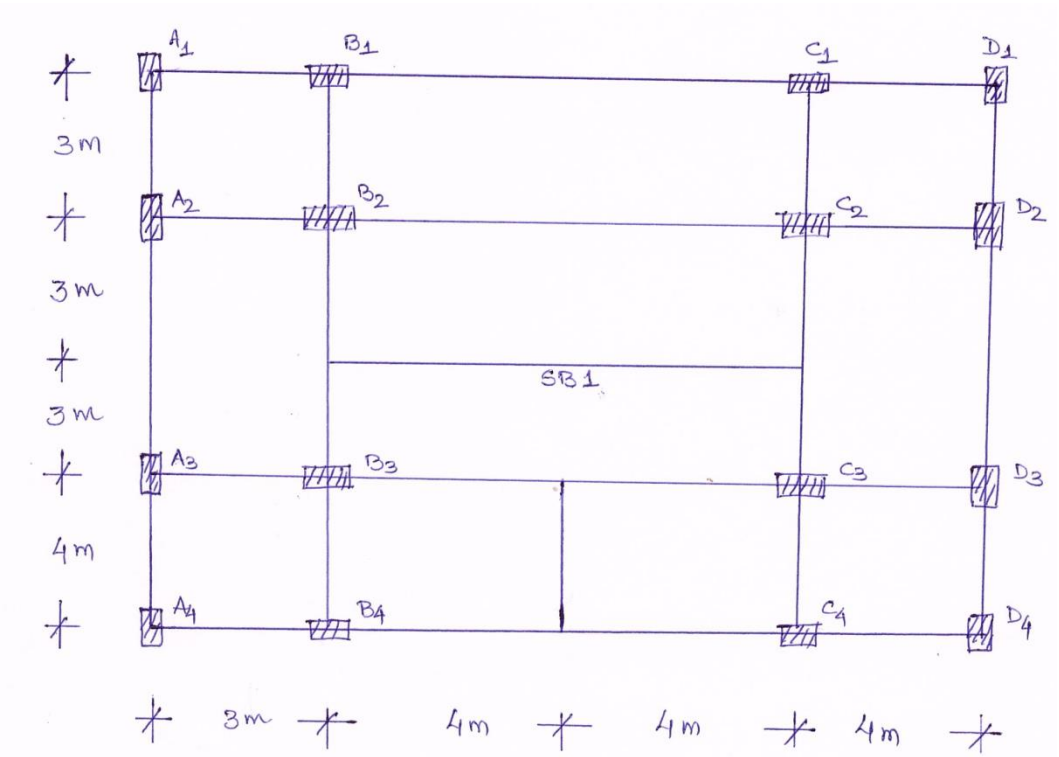

Figure 1 (Q.2(a)) and (Q.3)