

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

Subject Code: 2170607
Date: 26/11/2019
Subject Name: Design of Reinforced Concrete Structures
Time: 10:30 AM TO 01:30 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 whenever required.
5. IS 456, IS 3370, IS 875, SP 16, IS 1893, IS 1343, IS 13920 are permitted.
6. Use M20 grade of concrete and Fe415 grade of steel, if not given.

		MARKS
Q.1	(a) Mention the ductile detailing criteria for flexural members and explain where it is required.	03
	(b) Prepare structural layout for regular residential G+3 RC building frame having 4 bays of 5 m each in X– direction and 3 bays of 4 m each in Y–direction, designate all the members (slabs, beams, columns) and suggest the preliminary dimensions of RC members.	04
	(c) For the RC frame layout as prepared above, determine the axial load and bending moments on any one intermediate column for dead load and live load. Mention clearly designation of selected column.	07
Q.2	(a) Write down design criteria for shear reinforcement for RC structures.	03
	(b) Determine the load on any intermediate Continuous beam for the RC frame of Q-1(b).	04
	(c) Design the intermediate column for the forces obtained in Q. 1(C).	07
	OR	
	(c) Multistoried braced G+6 important building of 30 m height is having a plan dimension 20 m x 20 m, having bay width 5 m in both directions. The ground floor height is 5 m and all other floor height is 4 m. Parapet height is 1 m. The building is located at “Ahmadabad” under the terrain category II. 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. Design life year 100 years.	07
Q.3	(a) Enlist the Force acting on retaining wall with Sketch.	03
	(b) The cantilever retaining wall has to retain the earth with a horizontal top 4.5 m above ground level. Density of earth is 18 KN/m ³ and $\Phi = 30^\circ$ SBC of soil is 200 KN/m ² . Coefficient of friction μ is 0.5. Determine dimensions of the retaining wall. Use M20 grade of concrete and Fe 415 grade of steel.	04
	(c) For Q-3(b) above, Design the stem and draw diagram showing reinforcement details of it.	07
	OR	
Q.3	(a) Enlist the different types of Retaining wall and explain the usefulness for each.	03
	(b) The Counterfort retaining wall has to retain the earth with a horizontal top 5.5m above ground level. Density of earth is 16 KN/m ³ . $\Phi = 30^\circ$. SBC of soil is 200 KN/m ² . Coefficient of friction μ is 0.6. Determine dimensions of the retaining wall. Use M20 grade of concrete and Fe 415 grade of steel.	04
	(c) For Q-3 (b) above, Design stem and Counterfort.	07
Q.4	(a) Describe advantages and disadvantages of Flat slab.	03
	(b) Depict IS code provisions of Direct Design Method for flat slab.	04

- (c) Design an interior panel of flat slab having equal panels of 6 m x 6 m. The internal columns are 500mm in diameter and column head is 1000 mm in diameter. The Storey height above and below slab is 4 m. Design the flat slab with drop and column head. Live load 4 KN/m². Use M20 grade of concrete and Fe 415 grade of steel. **07**
- OR**
- Q.4** (a) Explain ductile detailing of column as per IS: 13920 with sketch. **03**
 (b) Explain Philosophy of Earthquake resistant design. Give four virtue of good earthquake resistant design. **04**
 (c) An 8 story R.C.C. building is located in zone III having 3 bays of 4 m in X-direction and 3 bays of 5 m in Y- direction. All beams are of size 300 x 500 mm and columns of are of size 400 x 500 mm. Slab thickness is 120 mm and all wall are 120 mm thick. Take live load 3 KN/m² and storey height 3 m. Find lateral load at each floor level. **07**
- Q.5** (a) Explain various Joints used in water tank with sketch. **03**
 (b) Draw the Intze tank and explain various structural elements of Intze tank. **04**
 (c) Fix the basic dimension of rectangular underground tank and design constants of capacity 70,000 liters. Use M30 concrete and Fe415 grade steel. Take saturate unit weight of soil 18 kN/m³ and $\Phi = 30^\circ$. Design long wall of water tank considering tank is empty and surrounding soil is saturated. Design all elements and furnish reinforcement Detailing. **07**
- OR**
- Q.5** (a) Fix the basic dimensions of Intze type container of an elevated water tank to store 8 laces liter of water. Height of staging =15m up to bottom of tank, wind load = 1.5 KN/m² throughout the height. Use M30 grade concrete and Fe 415 grade steel. **03**
 (b) For Q-5 (b) above, Design and detail top dome. **04**
 (c) For Q-5 (c) above, Design top ring beam and cylindrical wall. **07**
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