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

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2170607 **Date: 02/05/2017**

Subject Name: Design of Reinforced Concrete Structures

Time: 02.30 PM to 05.30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of IS:800, IS:875,IS:456,IS:3370, IS:1343,SP-16, IS 1893 and IS 13920 and steel table are permitted.**
5. **Use M20 grade of concrete and Fe 415 steel if not given any where.**

Q.1 Draw a typical layout of a G+3 residential building. Prepare structural layout and plot load distribution diagrams for typical floor. Design and detail a typical continuous beam or a typical column of the chosen building. **14**

Q.2 (a) A seven storied building, 20m X 30m plan dimensions and an overall height of 30m is to be designed at Ahmedabad city. Columns are spaced at 5m c/c in both directions. The building has 7 stories of height 4 m each. Take plinth is at 1m above G.L having no plinth beams but consider beams at 1m below G.L and footings are provided at 2 m below G.L. Assume overall depth of all beams = 500 mm and slab thickness 150 mm. Consider life of building 100 years, Category = 3 and Topography = plane. Compute wind loads acting on an internal frame at node points and plot wind pressure diagram as per provisions of IS: 875(Part-III). **07**

(b) Explain the followings briefly with necessary sketches.

(1)Various types of joints can use in water tanks. **03**

(2) 'Strong column-Weak beam' design concept. **04**

OR

(b) Give the guidelines for efficient earthquake resistant design of structures. **07**

Q.3 A cantilever retaining wall is designed to retain the earth 5 m high behind the wall. The unit weight of soil is 18 kN /m^3 and angle of internal friction is 22^0.The bearing capacity of soil is 130 kN/m^2 and coefficient of friction between base and soil is 0.4. Use M20- Fe 415. Assume depth of foundation is as 1 m. Fix the dimensions of retaining wall and design only stem. Also carry out stability checks. **14**

OR

Q.3 For the counter-fort retaining wall of height 7m above G.L., fix the basic dimensions of the various elements. Angle of repose of soil is 30°. SBC of soil is180 kN/m^2 and density of soil is 18 kN/m^3. Friction coefficient between soil and concrete is 0.55. Design and detail the stem of retaining wall. Use M20- Fe 415. Carry out usual stability checks. **14**

Q.4 Fix the dimensions of circular overhead water tank container with flat bottom for a capacity of 5 lakh liters. Design and detail top spherical dome, top ring beam and cylindrical wall of the container. Use M25 grade concrete and Fe 415 steel. **14**

OR

Q.4 Fix the basic dimensions of intze tank container of an elevated water tank to store 5 lakh litres water. Height of the staging is 16 m up to the bottom of the tank. Wind load = 1.5 KN/m^2 throughout the height. Design and detail (i) Top ring beam (ii) cylindrical wall. Use M30 & Fe415. **14**

Q.5 (a) Design an interior panel of a flat slab of panel size 5m x 5m without providing **07**

drop and column head. Size of columns = 300mm x 400 mm, Live load = 4 kN/m^2, Floor finish = 1 kN/m^2,Height of column 4m above and below slab. Use M20 concrete and Fe 415 steel.

(b) For typical floor shown in **Fig:1**, Find out (1) Centre of mass (2) Centre of stiffness (3) Eccentricity. Consider all columns are of 300 mm X 600mm. Assume uniform mass distribution. **07**

OR

Q.5 (a) Design an interior panel of a flat slab having equal panels of 6 m X 6 m. The internal columns are 400 mm in diameter and the column head is 800 mm in diameter. The storey height above and below slab is 4 m. Design the flat slab with drop and column head. Take live load 4 kN/m^2. Use M20 concrete and Fe-415 grade steel. **07**

(b) Give various methods of improving ductility of a structure. **07**

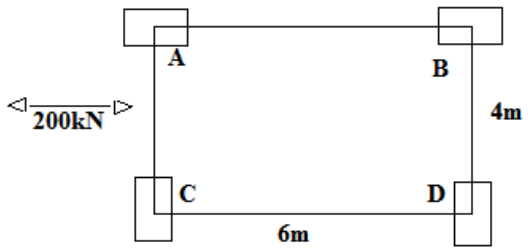

Fig:1

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