

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2170607

Date: 19/11/2018

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. IS 456, IS 3370, IS 875, SP 16, IS 1893, IS 1343, IS 13920 are permitted.
5. Use M20 grade of concrete and Fe415 grade of steel, if not given any where.

- Q.1**
- (a) Explain the different types of Retaining Wall. **03**
- (b) A cantilever retaining wall is designed to retain the earth 3.1 m high behind the wall, Fix the dimension of retaining wall and carry out all stability checks. The unit weight of soil is 17 KN/m^3 and angle of internal friction is 35° . The bearing capacity of soil is 195 KN/m^2 and coefficient of friction between base and soil is 0.46. Use M25 – Fe 415. **04**
- (c) For Q.1 (b) above, Design the stem. **07**

- Q.2**
- (a) Write the codal provisions for designs of one way continuous slab. **03**
- (b) Prepare structural layout and nominate all the members like slabs, beams, columns of G+3 building (whole structure) of having 5 bays of 5 m in X-direction and 6 bays of 4 m in Y-direction. **04**
- (c) Design any one slab panel of above example Q. 2(b) having one long edge discontinues. **07**

OR

- (c) Estimate the load on the continuous beam of span 4 m of above example Q.2 (b) and design it. **07**

- Q.3**
- (a) Explain in detail (i) Rigid floor Diaphragm effect (ii) Torsionally coupled and uncoupled system. **03**
- (b) An 8 storey R.C.C. building is located in Ahmedabad having 3 bays of 7.5 m in X-direction and 3 bays of 7.5 m in Y-direction. All beams are of size 250 x 400 mm and columns are of size 400 x 500 mm. Slab thickness is 150 mm and wall around periphery is 120 mm thick. Find seismic weight of the building with live load 3 KN/m^2 . Storey height is 3 m. **04**
- (c) Workout seismic forces on structure of above Q.3 (b). Consider hard soil, Residential building, Ductile detailing is to be done for the frame. **07**

OR

- Q.3**
- (a) Explain ductile detailing of column as per IS: 13920. **03**
- (b) Explain Philosophy of Earthquake resistant design. Give four virtues of good earthquake resistant design. **04**
- (c) A public building with seismic weight of 40000 KN with height of 30.5m is in Zone-III, Resting on medium soil site. Ductile detailing is to be done for the frame. Find total Base shear. **07**

- Q.4**
- (a) Discuss various elements of Flat slab with neat sketches. **03**
- (b) A 200 mm thick R.C.C. flat slab is loaded by live load of 4 KN/m^2 and floor finish load of 1 KN/m^2 . It is supported by 4 columns of size 300 x 400 mm, without providing drop and column head. The columns are placed at 4.5 m x 6 m centre to centre. Design the slab considering an

- interior panel.
- (c) For Q.4 (b) above, Check the slab for shear considering an interior panel. **07**
- OR**
- Q.4** (a) Write the advantages and disadvantages of flat slab. **03**
- (b) Explain the codal provision of Direct Design Method for flat slab. **04**
- (c) Workout wind load on an 8 storey building given in above Q.3 (b) considering general building with terrain category 3 and class of structure B on plain ground. Plot wind pressure diagram. **07**
- Q.5** (a) Fix the basic dimensions of Intze type container of an elevated water tank to store 5.8 lacs liter of water. Height of staging =15 m 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 (a) above, Design and detail top dome. **04**
- (c) For Q.5 (a) above, Design top ring beam and cylindrical wall. **07**
- OR**
- Q.5** (a) Explain various joints used in water tanks. **03**
- (b) The rectangular water tank rest on the ground. Length of tank = 6 m, width of tank = 4 m & Depth of water = 3.5 m. Use M30 concrete and Fe 415 grade of steel. Design long walls. **04**
- (c) For Q.5 (b) above, Design short walls with checks. **07**
