

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2170607
Date:14/05/2019
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. 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

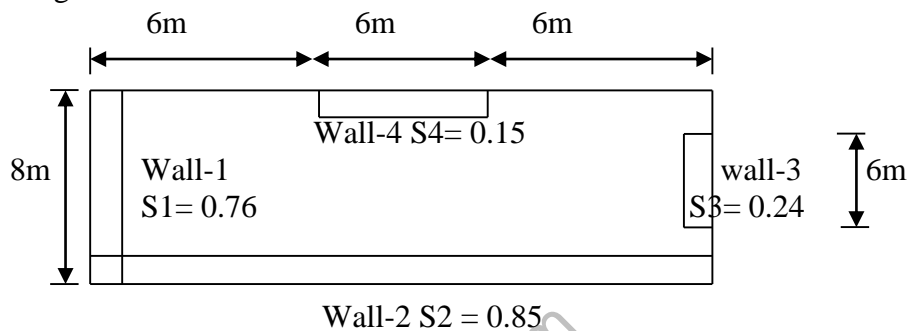
MARKS

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|------------|-----|---|-----------|
| Q.1 | (a) | Explain the Various types of joints can use in water tanks. with necessary sketches | 03 |
| | (b) | Explain the Strong column-Weak beam' design concept. | 04 |
| | (c) | Estimate wind forces for a water tank for the following data. Total height of tank=30 m. which includes height the supporting shaft = 22m, height of the bottom conical portion = 3 m, height of cylindrical portion = 4 m and rise of top dome =1m, diameter of supporting portion = 5 m and diameter of cylindrical portion =12m, location is Surat , Terrain category = 2 and class = B , ground plane with upwind slope less than 3°, Design life year 100 years. | 07 |
| | | | |
| Q.2 | (a) | Write the codal provisions for designs of one way continues slab. | 03 |
| | (b) | Prepare structural layout and nominate all the members like slabs, beams, columns of G+3 building (whole structure) of having 4 bays of 5 m in X –direction and 4 bays of 3 m in Y-direction. | 04 |
| | (c) | Enlist different types of slab form in of above layout Q.2 (b) and Design any one slab panel with reinforced details. | 07 |
| | | | |
| OR | | | |
| | (c) | Estimate the load on the Continues beam of span 5 m of above example Q.2 (b) and design it. | 07 |
| | | | |
| Q.3 | (a) | Draw the Intze tank and explain various structural elements of Intze tank. | 03 |
| | (b) | 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/m ³ and $\Phi = 30^\circ$. | 04 |
| | (c) | Design long wall of Q.3 (b) water tank the following two extreme case:
(1) Tank is empty and surrounding soil is saturated
(2) Tank if full and no soil outside. | 07 |
| | | | |
| OR | | | |
| Q.3 | (a) | Enlist the Force acting on retaining wall with Sketch. | 03 |
| | (b) | Design a cantilever retaining wall to retain the earth 4.5 m high behind the wall, Fix the dimension of retaining wall and carry out all stability checks. The unit weight of soil is 18 KN/m ³ and angle of internal friction is 30°. The bearing capacity of soil is 150 KN/m ² and coefficient of friction between base and soil is 0.55. Use M20 – Fe 415. | 04 |
| | (c) | Design the stem for Q.3 (b) | 07 |

- Q.4** (a) Discuss various elements of Flat slab with neat sketches. **03**
 (b) Explain the codal provision of Direct Design Method for flat slab. **04**
 (c) Design an interior panel of flat slab having equal panels of $5\text{m} \times 5\text{m}$. The internal columns are 500 mm in diameter and column head is 1000 mm in diameter. The storey height above and below slab is 4m. Design the flat slab with drop and column head. Live load 4 Kn/m^2 . M-20 concrete and Fe-415 steel. **07**

OR

- Q.4** (a) Write the advantage and disadvantage of flexible and stiff structure. **03**
 (b) Explain the codal provision of seismic coefficient method. **04**
 (c) Design Flat slab without drop and column head for Q.4 (c) **07**
- Q.5** (a) Explain in detail (i) Rigid floor Diaphragm effect (ii) Torsionally coupled and uncoupled system. **03**
 (b) Explain ductile detailing of Beam as per IS: 13920 **04**
 (c) Calculate center of mass and center of stiffness for a one story shear wall building with rigid diaphragm roof for the following data. Height of walls = 5m, height of parapet wall = 1 m, self weight of roof = 3.0 Kn/m^2 , self weight of wall = 5 Kn/m^2 . Shown in Fig. **07**



OR

- Q.5** (a) Explain in center of mass and center of stiffness. **03**
 (b) Explain requirements of shear wall as per IS: 13920 **04**
 (c) Calculate base shear for three storey RC frame school building located in Bhuj using seismic coefficient method for the following data. Number of bay in x direction = 3, Number of bay in y direction = 3, Bay width 4m in both direction, Height of storey = 3m, Dead load = 12 Kn/m^2 , Live load = 4 Kn/m^2 , Zone Iv. **07**