

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B.Tech. Summer 2018 - 19 Examination**

**Semester: 7**  
**Subject Code: 03104403**  
**Subject Name: Structural Design III**

**Date: 13/05/2019**  
**Time: 10:30am to 01:00pm**  
**Total Marks: 60**

**Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.
5. Allow IS 456, SP 16, IS 800, SP 6, IS 875, IS 1893, IS 13920, IS 3370

**Q.1 Objective Type Questions - ( Fill in the blanks, one word answer, MCQ-not more than Five in case (15) of MCQ) (All are compulsory) (Each of one mark)**

1. In a singly reinforced beam the effective depth is measured from its compression edge to
  - a) tension edge b) center of tensile reinforcement c) neutral axis of the beam
  - d) longitudinal central axis
2. By over reinforcing the beam, moment of resistance can be increased not more than \_\_\_\_\_.
3. As the percentage of steel increases
  - a) depth of NA decreases b) depth of NA increases c) lever arm increases
  - d) lever arm decreases e) none of above
4. If the diameter of the reinforcement bar is 'd', the anchor value of the hook is \_\_\_\_\_.
5. The maximum shear stress in a rectangular beam is
  - a) 1.25 times average b) 1.50 times average c) 1.75 times average d) 2.00 times average
  - e) 2.50 times average
6. The unit weight of reinforced concrete is \_\_\_\_\_.
7. The ratio of compressive strength to tensile strength is usually
  - a) 5 b) 1/5 c) 10 d) 1/10 e) 0.7
8. Normally value of span/depth ratio for simply supported beam is taken as \_\_\_\_\_.
9. The ratio of strength of concrete at 28 days to that after one year is
  - a) 0.60 b) 0.80 c) 0.90 d) 0.95 e) 0.99
10. The cement for concrete work is considered 'unfit for use' if the moisture absorbed is more than \_\_\_\_\_ %.
11. The design of heel slab in retaining wall is based on maximum bending moment due to
  - a) its own weight b) weight of soil above it c) load of surcharge d) all of above
12. The Neutral axis of T-Beam exists
  - a) within flange b) at bottom edge of slab c) below slab d) all of above
13. An R.C.C. column is treated as long if its slenderness ratio is greater than \_\_\_\_\_.
14. Cantilever retaining walls can safely be used for a height not more than \_\_\_\_\_.
15. For initial estimate for a beam design, the width is assumed \_\_\_\_\_
  - a) 1/15th of span b) 1/20th of span c) 1/25th of span d) 1/30th of span e) 1/40th of span.

**Q.2 Answer the following questions. (Attempt any three) (15)**

- A) Explain Magnitude and Intensity
- B) Discuss Architectural features of Buildings.
- C) The counter fort retaining wall has to retain the earth with a horizontal top 5.0 m above ground level. Density of earth is  $16 \text{ kN/m}^3$ . Angle of internal friction  $\phi$  is 30 degree. SBC of soil is  $190 \text{ kN/m}^2$ . Coefficient of friction  $\mu$  is 0.6. Determine dimensions of the retaining wall.
- D) Enlist and draw various elements of Intz tank

**Q.3** A) Determine the preliminary dimensions for a cantilever retaining wall from the following data: (07)

- Height of earth above lower GL = 5.5 m
  - SBC = 175 KPa
  - Angle of Repose = 30 degree
  - Coefficient of friction = 0.5
  - Unit weight of soil = 18 kN/m<sup>3</sup>
- Concrete M20, Steel Fe415

B) For the data mentioned in Q.3 (1), Find the Horizontal and Vertical Loads. (08)

**OR**

Find the forces in all the members of a steel foot over bridge for the following data: (08)

- Span of bridge-24m
- Width of walkway-4m
- Flooring RCC slab 110mm thick
- Live load-5kN/m<sup>2</sup>
- Floor finish-0.75kN/m<sup>2</sup>
- Use N-type lattice girder

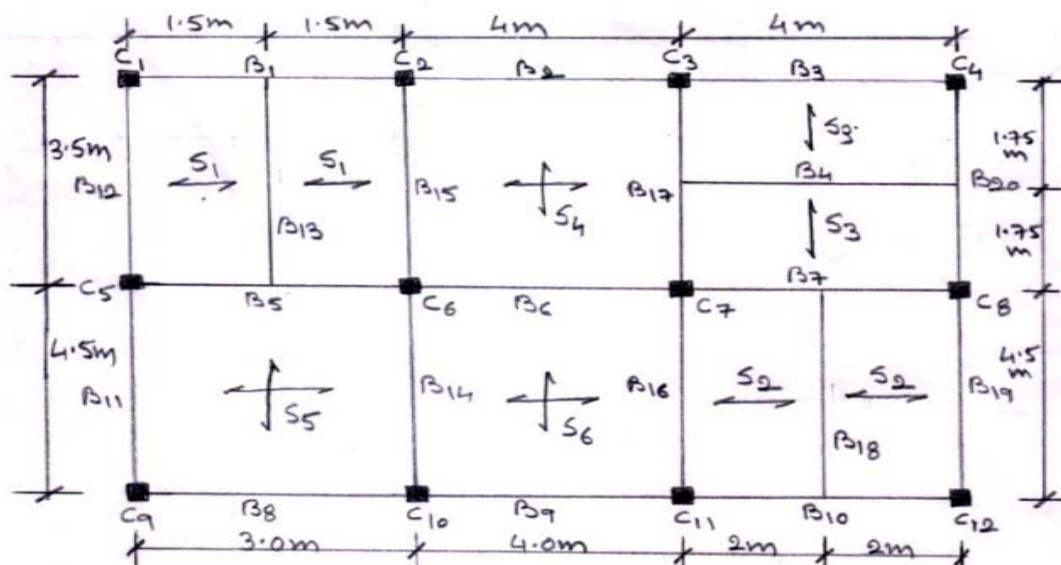
Assume necessary data if necessary.

**Q.4** A) Calculate the design wind pressure for the multistory building having plan dimensions of (20 x 30) m and having 4 bays in x- direction and 6 bays in y- direction of 5 m each. The height of building is 30 m. It is located in Surat city. Category of building is 3. Topography is plane with upwind slope < 3 degree. It is designed for 100 years life period. (07)

**OR**

A) Design Rectangular underground tank for capacity of 80000 litres. Use M<sub>20</sub> concrete and Fe<sub>415</sub> grade steel. Take Density of water as 10 kN/m<sup>3</sup> and φ is 30. Design only Long walls. (07)

B) For the building lay out shown in fig.01 with following details. Number of storey: G+3 Floor to floor height: 3.50 m External walls: 250 mm including plaster Internal walls: 150 mm including plaster Imposed load: Roof = 1.5 kN/mm<sup>2</sup>, Floor = 4.0 kN/mm<sup>2</sup> Floor finish: Roof = 1.5 kN/mm<sup>2</sup>, Floor = 1.0 kN/mm<sup>2</sup> Materials: M20 concrete and Fe415 steel (08)



**Fig.01**

- Analyse and Design Slab S<sub>4</sub>