

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**M.Tech., Winter 2017 - 18 Examination**

**Semester: 2****Subject Code: 03209180****Subject Name: Soil Structure Interaction****Date: 12/01/2018****Time: 02:00PM to 04:30PM****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.

**Q.1** A) Give the basic concept of soil-structure interaction and state how it differs from the conventional subject of soil mechanics and foundation engineering. **(05)**

B) Explain the method of determination of 'modulus of subgrade reaction' and the factors affecting the same. **(05)**

C) Explain different mitigation techniques for Liquefaction **(05)**

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

A) Define Liquefaction & Explain types of Liquefaction

B) Elaborate any two field tests for finding the dynamic soil properties

C) Explain soil line method to determine contact pressure and bending moments

D) Explain applications of geosynthetics in civil engineering

**Q.3** A) Calculate the cyclic stress ratio developed at the site for the given data **(07)**

| Depth(m) | 1    | 2    | 3    | 6    | 8    | 10   | 12   |
|----------|------|------|------|------|------|------|------|
| N        | 8    | 10   | 12   | 10   | 17   | 22   | 24   |
| $r_d$    | 0.99 | 0.98 | 0.96 | 0.93 | 0.90 | 0.88 | 0.85 |

Take  $a_{max} = 0.35g$ ,  $r_{sat} = 19 \text{ kN/m}^3$ . GWT is touching the GL. Also check the liquefaction potential at 2.0 m depth if CRR is 0.2.

B) Enlist the different elastic methods of analysis for a beam on elastic foundation. Briefly explain Winkler's model. State the limitations of the same if any. **(08)**

**OR**

B) A rectangular combined footing has  $L = 8.0 \text{ m}$ ,  $B = 2.0 \text{ m}$  and  $EI = 1800 \text{ MNm}^2$ . A 1.0 MN point load is acting at 2.0 m distance from the left edge and 2.0 MN point load is acting at 2.0 m from the right edge. Modulus of the sub grade for plate is determined to be  $70 \text{ MN/m}^3$  after all correction within the clayey foundation soil. Divide the foundation in two elements only and by finite difference method determine settlement, Contact pressure, SF and BM values at the nodal points **(08)**

**Q.4** A) Explain the process of designing a reinforced wall with Geotextile for internal & external stability. **(07)**

**OR**

A) State different types of sheet pile walls. Draw the sketches showing the pressure distribution **(07)**

B) A cyclic Triaxial test was performed over a saturated clayey sample and the maximum deviatoric stress at the axial strain of 1.6 % was 238 kPa. Find E & G at 1.6 % axial strain. **(08)**

The area of the hysteresis loop and the area of the triangle are 4.58 kPa and 1.71 kPa respectively. Calculate the damping coefficient. Take poisson's ratio as 0.5.