

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME - SEMESTER-IV • EXAMINATION – SUMMER 2015**

**Subject Code: 742001****Date: 01/05/2015****Subject Name: Soil Structure Interaction****Time: 2:30 pm to 5:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Elaborate the different types of geosynthetics. Give with suitable sketches the various functions and applications of geosynthetics in civil engineering. **07**
- (b)** A cyclic Triaxial test was performed over a saturated clayey sample and the maximum deviatoric stress at the axial strain of 1.4 % was 236 kPa. Find E & G at 1.4 % axial strain. The area of the hysteresis loop and the area of the triangle are 4.52 kPa and 1.65 kPa respectively. Calculate the damping coefficient. **07**
- Q.2 (a)** Explain Liquefaction and factors affecting it. Also, explain different mitigation techniques. **07**
- (b)** Explain different methods of analysis and design of foundations in short. Explain how Soil-Structure-Interaction is different among them. **07**
- OR**
- (b)** Elaborate any two laboratory and two field tests for finding the dynamic soil properties. **07**
- Q.3 (a)** Explain the following statement and comment on it. Rrigidity of the super structure has restraining and redeeming influence on differential settlements. **07**
- (b)** Explain with neat sketches the bearing capacity analysis of reinforced foundation bed by Binquet & Lee method. **07**
- OR**
- Q.3 (a)** State the different elastic methods of analysis for a beam on elastic foundation. In context of Hetenyi's solution, explain that Winkler's model is more reliable where criterion of design is allowable stresses, not the allowable deformations. **07**
- (b)** State different types of sheet pile walls. Draw the sketches showing the pressure distribution. **07**
- Q.4 (a)** Explain with the help of a neat sketch various elements of a reinforced earth wall, stating the specifications, requirements and functions of each element. **07**
- (b)** Explain modulus of subgrade  $k_p$  and  $k_v$ . For the same soil type, will they be different or same? Why? **07**
- OR**
- Q.4 (a)** Draw the pressure distribution diagram, for a cantilever sheet pile embedded in sandy deposit, and explain calculation for the depth of embedment. **07**
- (b)** Enlist the different factors affecting contact pressures under the spread footings. If a point load is increased from elastic to ultimate value then what would be its effect on contact pressures of a perfectly rigid footing? Explain with the help of neat sketches. **07**

- Q.5 (a)** Explain with reasons why Self-weight of foundation is not considered in the foundation design? Mention Bowles's comments in this context. **07**
- (b)** Explain the effects of coupled and uncoupled springs, in the context of soil types. **07**

**OR**

- Q.5 (a)** Explain the process of designing a reinforced wall with Geogrid for external and internal stability. **07**
- (b)** For a rail road/rail track as a beam on elastic foundation, explain how Hetenyi's solution can be used? Mention limitations also. **07**

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