GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2714301 Subject Name: Advanced Geotechnical Engineering Time: 2:30 pm to 5:00 pm **Total Marks: 70**

Date:04/01/2017

Instructions:

- 1. Attempt all questions.
- Make suitable assumptions wherever necessary. 2.
- 3. Figures to the right indicate full marks.
- 0.1 (a) Explain in brief Mohr- Coulomb failure criteria. Comment on the various state 07 of stress for sample under shear test using failure envelope.
 - A concentrated load of 40 kN acts on the surface of a soil. Plot the variation of 07 **(b)** vertical stress at increment of 2m, up to a depth of 10 m below surface beneath the load using Boussinesq's equation.
- Write brief note on Newmark's influence chart and its application Q.2 07 **(a)**
 - **(b)** Explain in brief the behavior of over consolidated clay under shear test using 07 failure envelope.

OR

- (b) An unconfined compression test was conducted on an undisturbed sample of 07 clay. The sample had a diameter of 37.5 mm and was 80 mm long. The load at failure measured by the proving ring was 28 N and the axial deformation of the sample at failure was 13 mm. Determine the unconfined compressive strength and undrained shear strength of the clay.
- What is stress path? Give its importance. Which different stress paths are Q.3 07 **(a)** generally used by engineers?
 - Explain the phenomenon of consolidation of clay by Terzaghi's theory and 07 **(b)** discuss its limitations.

OR

- A clay layer has a thickness of 5 m and is subjected to a pressure of 60kN/m^2 . If 07 Q.3 (a) the layer has a double drainage and undergoes 50% consolidation in one year. Determine the coefficient of consolidation taking $T_v = 0.197$. Also if the coefficient of permeability is 0.025m/year, determine the settlement in one year and rate of flow of water.
 - (b) Distinguish clearly between quick sand and liquefaction phenomenons for soil. 07
- An earth dam of homogeneous section with a horizontal filter is shown in Fig.1. **Q.4** 07 (a) If the coefficient of permeability of the soil is 3×10^{-3} mm/s, find the quantity of seepage per unit length of the dam.



How can we find Coefficient of consolidation from consolidation test? Explain 07 **(b)** any one method to find the same in detail.

07 (a) Write brief note on flownet. **Q.4** (b) Explain in detail active earth pressure, passive earth pressure and earth pressure 07 at rest with neat sketch. Differentiate between Rankine's and Couloumb's earth pressure theories. Q.5 07 (a) Write and discuss assumptions in Coulomb's theory. (b) Write steps used to sketch the top flow line for an earth dam with horizontal 07 filter as discharge face with help of neat sketch. OR A retaining wall with a smooth vertical back retains sand backfill for a depth of 14 Q.5 **(a)** 6m. The backfill has a horizontal surface and has the following properties: $c = 0, \Phi = 28^{\circ}; \gamma = 16 \text{ kN/m}^3; \gamma_{sat} = 20 \text{ kN/m}^3$ Calculate the magnitude of the total thrust against the wall for the conditions given below:

(a) Backfill fully drained but the top of the wall is restrained against yielding

Determine also the point of application of the resultant thrust for this case

(C) Wall free to yield, water table at 3 m depth and there is no drainage.

(b) Backfill fully drained and the wall is free to yield

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