

GUJARAT TECHNOLOGICAL UNIVERSITY**ME - SEMESTER– I (New course)• REMEDIAL EXAMINATION – SUMMER 2015****Subject Code: 2714301****Date:13/05/2015****Subject Name: Advanced Geotechnical Engineering****Time: 10:30 am to 1:00 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) What is Mohr- Coulomb's strength theory for soils? Sketch typical strength envelope for a clean sand. **07**
- (b) A certain sand sample is just at the point of failure in a triaxial test. The major and minor principal stresses are 400 and 100 kN/m². Draw the Mohr diagram and determine the direct & shearing stresses and obliquity angle on the plane of maximum shear and the plane of maximum obliquity. **07**

- Q.2** (a) Write a note on Newmark's chart. **07**
- (b) Discuss Terzaghi's theory of consolidation stating the various assumptions and their validity? **07**

OR

- (b) What do you understand by the state of general plastic equilibrium? Explain the concept of active and passive earth pressures with the help of Mohr circle and shear strength envelope. **07**
- Q.3** (a) Following compression readings were recorded during a consolidometer test on a saturated clay specimen ($G = 2.72$), when the pressure was increased from 100-200 kN/m². **07**

Time in min.	0	0.1	0.25	0.50	1.0	2.0	4.0	8.0	16.0
Dial reading (mm)	2.95	3.00	3.04	3.10	3.16	3.22	3.32	3.42	3.64
Time in min.	32.0	60.0	120.0	240.0	480.0	1000.0	1440.0		
Dial reading (mm)	3.82	3.94	4.10	4.18	4.27	4.36	5.00		

The initial thickness of the sample was 20.00 mm and its end of test water content was 25 % .Determine the coefficient of consolidation from the root time plot, and the values of the three compression ratios. Determine also the coefficient of permeability.

- (b) What is stress path? Explain different types of stress paths that can be obtained in a triaxial test with sketch **07**

OR

- Q.3** (a) The results of a direct shear test on dry sand are normal stress 96.6 kN/m²; shear stress at failure 67.7 kN/m². By means of Mohr's diagram find the direction and magnitude of the principal stresses acting on a soil element in the failure zone. **07**
- (b) What is the coefficient of consolidation? What is its use in the settlement **07**

analysis? How is it determined?

- Q.4 (a)** Write note on Rankine's theory of earth pressure. **07**
(b) A square footing 2m x 2m carries a uniformly distributed load of 314 kN/m². **07**
Find the intensity of vertical pressure at a depth of 4 m below a point 0.5 m inside each of two adjacent sides of the footing.

OR

- Q.4 (a)** A masonry retaining wall of trapezoidal section with the vertical face on the earth side is 1.5 m wide at the top and 3.5 m wide at the base and is 5.0 m high. **07**
It retains a sand fill sloping at 2 horizontal to 1 vertical. The unit weight of sand is 18 kN/m³ and $\phi = 30.0^\circ$. Find the total active thrust on the wall.

- (b)** Write and explain the Boussinesq's equation for stress distribution in soil for **07**
(i) a point load and (ii) Line load.

- Q.5 (a)** What is critical void ratio? How would you determine it in the laboratory? Also **07**
explain the conditions causing liquefaction of sand.
(b) What do you understand by contact pressure? What are the factors that affect **07**
the contact pressure distribution? Draw the contact pressure distribution diagram for flexible and rigid footing on sand and clayey soils

OR

- Q.5 (a)** Write note on properties and uses of a flow net in detail. **14**
