

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2150609

Date:09/05/2018

Subject Name:Soil Mechanics

Time:02:30 PM to 05:00 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 stability number? Explain its uses. **03**
 - (b) List and explain the factors affecting compaction. **04**
 - (c) Describe the friction circle method of analysing the stability of slopes. **07**

- Q.2**
- (a) Explain in detail the construction of newmark's influence chart. **03**
 - (b) What are the different methods of compaction adopted in the field? How would you select the type of roller to be used? **04**
 - (c) The following observations were made in a standard proctor test. **07**

Trial no.	1	2	3	4	5	6
Mass of wet soil(Kg)	1.70	1.89	2.03	1.99	1.96	1.92
Water content(%)	7.7	11.5	14.6	17.5	19.7	21.2

Volume of mould=945 cc. $G=2.67$

Determine maximum dry density and optimum moisture content. Also plot zero air voids line.

OR

- Q.3**
- (c) State Assumption made in Boussines theory. **07**
 - (a) Explain the principle of the Direct shear test. What are the advantages of this test? **03**
 - (b) Explain the Mohr-Coulomb strength envelope. **04**
 - (c) What are the advantages and disadvantage of Triaxial compression test? Briefly explain how you conduct the test and compute the shear parameters for the soil from the test data. **07**

OR

- Q.3**
- (a) Compare the direct shear test and triaxial compression test. **03**
 - (b) Consolidation drained triaxial test data: a specimen of clay fails at a cell pressure of 60 KN/M^2 . The effective shear parameters are $C'=15 \text{ KN/M}^2$ and $\phi=10^\circ$. Determine the compressive strength. **04**
 - (c) Discuss the shear characteristics of cohesionless soil and cohesive soils. **07**
- Q.4**
- (a) A rigid retaining wall, 6 m high is restrained from yielding. The backfill consists of cohesionless soil having $\phi=26^\circ$. And $\gamma=19 \text{ kN/m}^3$. Calculate the total earth pressure per meter length of the wall. **03**
 - (b) Define consolidation. What are its causes? **04**
 - (c) Discuss Culmann's method for the determination of active earth pressure. **07**

OR

- Q.4**
- (a) What are the different types of earth pressure? Give examples. **03**
 - (b) Difference between active earth pressure and passive earth pressure. **04**
 - (c) A retaining wall 6 m high supports the backfill with horizontal top, flush with the top of the wall. The backfill has $C_u=30 \text{ KN/M}^2$, $\gamma=20 \text{ kN/m}^3$ and $\phi=30^\circ$. The backfill carries surcharge of 20 kN/m^2 . The wall is pushed towards the backfill. Compute the total passive earth pressure on the wall and its point of application. **07**

- Q.5** **(a)** What are the purposes of foundation? **03**
(b) A soil sample 20 mm thick takes 20 minutes to reach 20% consolidation. Find the **04**
time taken for a clay layer 6m thick to reach 40% consolidation. Assume double
drainage in both cases.
(c) A new canal is excavated to a depth of 5m below ground level, through a soil having **07**
the following characteristics: $C=14 \text{ KN/M}^2$, $\phi=15^\circ$, $e=0.8$ and $G=2.70$. The slope of
banks is 1 in 1. Calculate the factor of safety with respect to cohesion when the canal
runs full. If it is suddenly and completely emptied, what will be the factor of safety?

OR

- Q.5** **(a)** Different between shallow foundation and deep foundation. **03**
(b) Calculate the factor of safety with respect to cohesion of a clay slope laid at 1 in 2 to **04**
a height of 10 mt, if the angle of internal friction $\phi=10^\circ$, $C=25 \text{ kN/m}^2$ and $\gamma=19$
 kN/m^3 . What will be the critical height of the slop in this soil?
(c) What are the basic modes of failure of earth slopes? Briefly outline the remedial **07**
measures that can be undertaken against failure of slopes.
