RTU Previous Year Question Papers BE CE 8th Semester Geotechnical Engineering – II

UNIT-I

(a) Explain the Bossiness's assumptions for stress distribution in soil mass. Derive an expression for obtaining stress at any given point below the ground surface due to point load.

(b) A point load of 100 kN acts at ground surface. Plot the stress distribution below the ground surface with depth for the conditions.

(i) Directly under the load

(ii) On a vertical plane lm away from point of application of load.

OR

(a) Derive an expression for obtaining stress on a given point below the ground surface due to a 'line load', based on Bossiness theory.

(b) A rectangular loaded raft foundation is subjected to a uniformly distributed load of 200 kN/m^2, find the stress at depth 5m below the point '0' shown in fig. 1.

UNIT - II

2 (a)Explain the 'Spring Analogy' to describe the compressibility behaviour of soil. Also explain the different elements of spring analogy representing the soil structure.

(b)In a consolidometer test a clay specimen initially 25 mm thick attained 90% consolidation in 10 min. In the field clay stratum has thickness 6m from which sample was taken. A structure constructed on it experienced an ultimate settlement of 200 mm. Estimate the settlement after 100 days of application

OR

(a)Explain the difference between compaction and consolidation of soil.

(b)Explain compressibility parameters of soil and their applications.

(c) A 25 mm thick sample has been obtained from a saturated clay layer of 5m thick having drainage at top and bottom. The sample was tested in the laboratory and reached 50% consolidation in 50 min. How much time it will take to reach the same degree of consolidation for the layer in the field. Also compute the required time if single drainage allowed in the field.

UNIT - III

3 (a)Explain the determination of factor of safety for the infinite slopes for (a) Dry condition (b) Flow in parallel to slope at ground surface, in cohesionless soil.

(b) An infinitely long slope having an inclination 26° in an area is underlain by firm cohesive soil (G=2.72, e = 0.5). There is thin weak layer of 6m below and parallel to slope surface (c'=25 kN/m^2, <J>=16°). Compute the factor of safety when slope is dry. If ground water flow occur parallel to the slope on the ground surface, what factor of safety would result?

OR

(a) Explain the friction circle method for determination of factor of safety for finite slopes.

(b) A cutting of 10 m deep is to be made having soil properties r = 19 kN/m^3, Cu = 20 kN/m^2 <|>$_M$= 15°, what maximum angle of slope that will have factor safety against failure 1.5. Use Taylor's stability numbers as given for <J>$_m$= 10°.

Angle of slope (p)	Taylor's stability number (Sn)
15°	0.023
20°	0.040
25°	0.049
30°	0.075

UNIT - IV

4 (a) Explain the different states of earth pressure. Give the values of strain, which is required for full mobilization of active earth pressure.

(b) Compute the total earth pressure and its point of application for the retaining wall AB' shown in fig. 2.

OR

4 (a)Explain the Ruthann's graphical method for computation of active earth pressure. Also explain how would you obtain the active earth pressure when <p = . (i.e. angle of friction is equal to angle of surcharge line)

(b)What would be the depth of unsupported cut if the soil properties are y = 18 kN/m^3, <p= 25° and C_u = 20 kN/m^2.

UNIT -V

5 (a) Enumerate the factors affecting the bearing capacity of soil and also discuss their effects on bearing capacity.

(b) Find out the size of a square footing which will be having its base at a depth 2.5 m below ground level and required to carry a load of 1750 kN. The settlement of footing is restricted to 10 mm and factor of safety against bearing capacity failure is 3 only. Given unit wt. of soil 19 kN/m^3, $N_c = 25$, $N_q = 12$ and Ny = 6. Allowable bearing pressure 800 kN/m2, obtained from plate load test on 30 cm square plate corresponding to 25 mm settlement.

OR

(a) Explain the details of plate load test and methods of obtaining the ultimate bearing capacity from plate load test.

(b) What corrections are applied to observed standard penetration test values (SPT), give details of each.