MAY 2019/ENDSEM

S. Y. B. TECH. (CIVIL) (SEMESTER - II)

COURSE NAME: Geotechnical Engineering

COURSE CODE: CVUA22175

(PATTERN 2017)

Time: [2 Hours]   [Max. Marks: 50]

(*) Instructions to candidates:
1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed
4) Use suitable data where ever required

Q.1) a) Define the terms: water content, void ratio, degree of saturation, [6] specific gravity and state different methods to find water content of a given soil.

OR

b) Draw a neat sketch of plasticity chart as given by IS and classify [6] the soil with liquid limit = 75% and plastic limit=42% according to the chart.

Q.2) a) State Darcy's law, define coefficient of permeability and derive [6] equation for coefficient of permeability used in constant head method.

OR

b) With a neat sketch explain "quick sand condition" and derive [6] expression for critical hydraulic gradient.

Q.3) a) Distinguish between Boussinesq's theory and Westergaard [6] Theory of stress distribution.

OR

b) A partially saturated soil from an earth fill has natural water [6] content 0f 19% and bulk unit weight of 19.33 kN/m$^{3.0}$. Assuming G = 2.6, determine the degree of saturation, void ratio and porosity.

Q.4) a) Which shear test is suitable for saturated clayey soil? Write down [4] the formula and meaning of all terms.

OR

b) Determine shear strength in terms of effective stress on a plane [4] within a saturated soil mass at a point where the total normal stress is 200 kN/m^2 and pore water pressure is 80 kN/m^2. The effective stress shear strength parameters for the soil are c'= 16 kN/m^2 and ø' = 39^0.

Q.5) a) Explain Rehbann's graphical method for evaluation of earth [6] pressure.

b) Explain Active, Passive Earth pressure with respect to wall [4] movements with sketches.

c) Find the critical height of excavation of a vertical cut in a [4] cohesive soil if c = 30 kN/m² & γ = 18kN/m³.

OR

Q.6) a) Compute the active earth pressure at a depth of 4 m in sand [6] whose angle of friction is 35⁰ and density is 15.1kN/m³ in dry state. Also compute the active earth pressure if the water table rises to the ground level. Assume saturated unit wt. of soil 22 kN/m³.

b) State assumption in Rankine's earth pressure theory. [4]

c) A wall 6 m high has a smooth vertical back and it retains a non- [4] cohesive level back fill with γ = 18 kN/m³, ø = 30⁰. Determine the total lateral earth pressure in active state.

Q.7) a) Explain with sketch the different types of failures of slopes. [6]

b) State any four ground improvement techniques. Explain any one [4] in detail

c) State any four types of soil reinforcement. Explain any one in [4] detail.

OR

Q.8) a) What is infinite slope and finite slope? Give examples. [6]

b) State four causes of slope failure. [4]

c) What is soil stabilization? What are the different methods of soil [4] stabilization?