BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)
B.Tech.Sem - VI CIVIL : WINTER- 2022
SUBJECT : GEOTECHNICAL ENGINEERING

Day : Tuesday | Time : 10:00 AM-01:00 PM

Date : 29-11-2022 | **W-13612-2022** | Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagram **WHEREVER** necessary.
4) Assume suitable data if necessary.

Q.1 **a)** Distinguish between: **(05)**
- i) Residual soil and transported soil.
- ii) Coarse grained and fine grained soil.

b) The bulk unit weight of soil sample is 20KN/m^3. The specific gravity of soil solids is 2.65 and water content 20%. Calculate porosity, void ratio, degree of saturation and dry unit weight. Take unit weight of water $\gamma_w = 9.81 KN/m^3$. **(05)**

OR

Q.1 **a)** What do you mean by three phase system? Explain the same when it will become two phase system? **(05)**

b) Derive the relationship between γ_d, G, γ_w and e. **(05)**

Q.2 **a)** Briefly explain consistency limit and indices. **(05)**

b) Explain step by step core cutter method to determine field density. **(05)**

OR

Q.2 **a)** In a specific gravity test, the following observations were made. **(05)**
Weight of dry soil = 105.0 gm
Weight of bottle + soil + water = 539.0 gm
Weight of bottle + water = 474.8 gm
Calculate the specific gravity of soil solids? Derive the relationship used?

b) Define: i) Flow index ii) Toughness index **(05)**
ii) Coefficient of curvature iv) Coefficient of uniformity
v) Effective diameter (D_{10}).

Q.3 Differentiate between constant head type and variable head type permeameters. Derive the expressions for the coefficient of permeability as obtained for both these permeameters. **(10)**

OR

Q.3 **a)** A sand deposit is made up of three horizontal layers of equal thickness. The permeability of top and bottom layers is 2 x 10^{-4} cm/sec and that of middle layer is 3.2 x 10^{-2} cm/sec. Calculate the equivalent permeability in horizontal and vertical direction. **(05)**

b) What do you understand by quick sand condition? Calculate the critical gradient of soil if specific gravity is 2.65 and void ratio 0.95. **(05)**

P.T.O.

Q.4 a) What is compaction curve? Give its salient features. What is a zero air void line? (05)

b) A concentrated load of 25 KN acts on the surface of a homogeneous soil mass of large extent. Find the stress intensity at a depth of 15 meters. (05)

i) Directly under the load

ii) At a horizontal distance of 7.5 meters away from the axis of loading. Use Boussinesq's equation.

OR

Q.4 a) Explain the term "geostatic stress". The unit weight of sand deposit is $20KN/m^3$. Determine geostatic stresses at a depth of 3m. (04)

b) Differentiate between standard proctor test and modified proctor test. Explain the terms MDD and OMC. (06)

Q.5 a) A shear vane of 7.5 cm in diameter and 15 cm in height was pressed into clay in a bore hole. The torque was applied and gradually increased to 50 N.m when failure took place. Determine undrained shear strength. (05)

b) Explain Mohr coulomb's failure theory. (05)

OR

Q.5 a) What are the factors affecting shear strength of soil? (05)

b) State the advantages and disadvantages of direct shear and triaxial test. (05)

Q.6 a) Define active and passive earth pressure. State the assumptions made by Rankine for the derivation of earth pressure. (05)

b) A retaining wall 6m high, retains dry sand with an angle of internal friction 30^0 and unit weight of $16.2\ KN/m^3$. Determine the earth pressure at rest if the water table rises to the top of the wall. Also determine the increase in the pressure on the wall. Assume the submerged unit weight of sand as $10KN/m^3$ and unit weight of water $10KN/m^3$. (05)

OR

Q.6 a) Describe the coulomb's wedge theory for determining active earth pressure indicating the various assumptions made. (05)

b) Explain at rest condition earth pressure against a retaining wall. (05)

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