Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5057]-205

S.E. (Civil) (First Semester) EXAMINATION, 2016

GEOTECHNICAL ENGINEERING

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Answer Q. No. **1** or Q. No. **2**, Q. No. **3** or Q. No. **4**, Q. No. **5** or Q. No. **6**, Q. No. **7** or Q. No. **8**.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right indicate full marks.

(*iv*) Use of calculator is allowed.

(*v*) Assume suitable data, if necessary.

1. (*a*) Define coefficient of curvature and uniformity coefficient and state the values of Cu and Cc used to classify the soils. A soil has a plastic limit of 28% and plasticity index of 30%. If natural water content of soil is 32%, what is the liquidity and consistency index ? [6]

(*b*) Derive the expression for coefficient of permeability of soil for falling head method. [6]

Or

2. (*a*) Derive the relation between γd, G, w and n_a. [6]

(*b*) What do you understand by critical hydraulic gradient ? Derive the expression for the same. [6]

P.T.O.

3. (*a*) Define pressure bulb and write down its significance.

A concentration load of 40 kN acts on the surface of homogeneous soil mass of large extent. Find the stress intensity at a depth of 10 meters by using Boussinesq's theory at a horizontal distance of 5.0 m. [6]

(*b*) Explain direct shear test with respect to the drainage and loading conditions. [6]

Or

4. (*a*) A cohesive soil has an angle of shearing of 15° and cohesion of 35 kN/m^2. If the specimen of this soil is subjected to triaxial compression test, find the value of cell pressure in the cell for failure to occur at a total stress of 300 kN/m^2. [6]

(*b*) Explain the factors affecting compaction of soil with neat sketches. [6]

5. (*a*) Explain Active, Passive and At rest pressure. Derive the expression for coefficient of earth pressure at rest. [6]

(*b*) Compute the active earth pressure at a depth of 4.0 m in sand whose angle of friction is 35° and density is 15.1 kN/m^3 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/m^3. [7]

Or

6. (*a*) Explain Coulomb wedge theory for determination of earth pressure. [6]

(*b*) A vertical excavation was made in a clay deposit having weight of 20 kN/m^3. It caved in after depth of digging reached 4 m. Taking the angle of internal friction zero calculate the value of cohesion. If the same clay is used as a backfill against a retaining wall up to height of 8 m, calculate total active earth pressure and total passive earth pressure. [7]

7. (*a*) What is geochemical attenuation capacity of soil ? Explain role of soil as a geochemical trap. [6]

(*b*) A cutting 5m deep is made in a clay at a slope of 45°. The bulk-density of clay is 18.2 kNm^3 and the angle of shearing resistance is 10°. What is the value of cohesion necessary to give a factor of safety of 1.5 with respect to cohesion ? [7]

Or

8. (*a*) Calculate the factor of safety with respect to cohesion of a clay slope laid 1 in 2 to a height of 10 m if the angle of internal friction is 10°, c = 25 kN/m^2 and γ = 19 kN/m^3. What will be the critical height of the slope in this soil ? Assume S_n = 0.064 for $\phi = 10^{\circ}$ and the given slope. [7]

(*b*) What would be the type of subsurface contamination if the following wastes are dumped on ground surface in a low lying area : [6]

(*i*) Sludge from effluent treatment plant of a chrome-plating unit.

(*ii*) Ash i.e., residue obtained after burning of waste in an incineration plant

(*iii*) Overburden excavated during mining of coal ?