

Roll No.

Total No. of Questions : 09]

[Total No. of Pages : 03

B.Tech. (Sem. - 6th)

GEOTECHNICAL ENGINEERING

SUBJECT CODE : CE - 304

Paper ID : [A0619]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

Section - A

Q1)

(10 × 2 = 20)

- a) Define adsorbed water.
- b) What are soil-aggregate properties?
- c) Write name of any four tests used for determination of in-situ unit weight.
- d) Distinguish in brief between seepage velocity & superficial velocity.
- e) Distinguish between normally consolidated and over-consolidated soils.
- f) Show plot of variation of B-factor (pore pressure coefficient) with degree of saturation.
- g) What is passive earth pressure?
- h) Define plastic limit.
- i) A lateral pressure in a triaxial compression test in a cohesive soil gave angle of shearing resistance = 17.5° , cohesion = 3.0 kg/cm^2 , total axial stress at failure = 18 kg/cm^2 , Determine the lateral pressure.
- j) Give any two assumptions of wedge theory.

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P.T.O.

Section - B

(4 × 5 = 20)

- Q2) An imaginary soil mass is contained in a container measuring 10cm×10cm×10cm. The soil consists of spherical grains of size 1cm in diameter. Determine maximum possible void ratio & percent solids.
- Q3) The Atterberg limits of a clayey soil are liquid limit = 63%, plastic limit = 40% and shrinkage limit = 27%. If a sample of this soil has a volume of 10cm³ at the liquid limit and a volume of 6.4 cm³ at the shrinkage limit, determine specific gravity of solids, shrinkage ratio and volumetric shrinkage.
- Q4) What is optimum moisture content? If you are called upon to advise the construction of earthen bank for an important highway, explain in detail what preliminary investigations you will conduct regarding
- Selection of embankment material.
 - Selection of proper procedure for field compaction.
- Q5) (a) List various factors which affect the coefficient of permeability of soil.
(b) In a variable head permeability test, the diameter of soil sample was 1.4cm and length 12.5cm. Find the diameter of stand pipe if fall of head from 60 to 25cm. is desired in 4.3 minutes.
Take $K = 8.6 \times 10^{-2}$ cm/sec
- Q6) Calculate the total active thrust on a vertical wall 5m high, retaining a sand of density 1.7 g/cc for which $\phi = 35^\circ$. The surface of sand is horizontal and water table is below the bottom of the wall.
Determine also the thrust on the wall if water table rises to a level 2m below the surface of sand. Take saturated density of sand = 2 g/cc.

Section - C

(2 × 10 = 20)

- Q7) (a) Obtain the differential equation defining the one-dimensional consolidation as given by Terzaghi, listing the various assumptions.
(b) A sand fill compacted to a bulk density of 18.84 kN/m³ is to be placed on a compressible saturated marsh deposit 3.5m thick. The height of the sand fill is to be 3m. If the volume compressibility = 7×10^{-4} m²/kN, estimate the final settlement of the fill.

Q8) A shear box test carried out on a soil sample gave

<u>Test No.</u>	<u>Vertical Stress</u> (kN/m ²)	<u>Horizontal shear stress</u> (kN/m ²)
1	100	80
2	200	144
3	300	216

Determine magnitude of major and minor principal stress at failure when vertical stress on sample = 200 kN/m². Determine also the inclination of these stresses to horizontal.

Q9) Write short notes on any two of the following :

- (a) Sieve Analysis.
- (b) Triaxial shear test.
- (c) Causes of Over consolidation.



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