



RM-6447

B. E. II (Sem. IV) (Civil) Examination

April / May – 2010

Geotechnical Engg. - I

Time : Hours]

[Total Marks :

Instruction :

(1)

नीचे दृष्टाविले निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. 2 (Sem. 4) (Civil)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Geotechnical Engg. - 1"/>	<input type="text"/>
Subject Code No. : <input type="text" value="6"/> <input type="text" value="4"/> <input type="text" value="4"/> <input type="text" value="7"/>	Section No. (1, 2,.....) : <input type="text" value="1&2"/>
	<input type="text" value="Student's Signature"/>

- (2) Write answers to the **two** section in **two sepearte** answer book.
- (3) Assume suitable data wherever **necessary** and state the same clearly.
- (4) Figure to the **right** indicate full marks.
- (5) Use of non-programmable calculator is permitted.

- 1 (a) Explain following terms : (any **five**) **10**
 - (i) Dry unit weight
 - (ii) Water content
 - (iii) Zero air void line
 - (iv) Relative density
 - (v) Air content
 - (vi) Liquidity index
 - (vii) Degree of saturated.
- (b) Draw phase diagram of soil showing all concept of phase diagram. **4**
- (c) Derive relation between Bulk unit weight(γ), specific gravity, void ratio and degree of saturation (Sr). **4**

OR

- (c) The mass specific gravity of soil equals 1.64. The specific gravity of solids is 2.70. Determine the voids ratio under the assumption that the soil is perfectly dry. What would be the void ratio, if sample is assumed to have water content of 8 percent? **6**
- 2 (a) Determine liquid limit of solids by casagrand's test in laboratory. **4**

- (b) Determine specific gravity test in laboratory step by step. 4

OR

- (b) State and discuss - correction involves into Hydrometer test. 4
- (c) An undistributed saturated specimen of clay has a volume of 18.9 cm^3 and a mass of 30.2 g. On oven drying the mass reduces to 18.0g. The volume of dry specimen as determined by displacement of mercury is 9.9 cm^3 . Determine shrinkage limit; specific gravity, shrinkage ratio. 6

OR

- (c) A soil sample, consisting of particles of size ranging from 0.5 mm to 0.01 mm. Put on the surface of still water tank 5 meter deep. Calculate the time of settlement of coarsest and finest particles of the sample to the bottom of tank. Assume avg. specific gravity of soil particles 2.66 and viscosity of water as 0.01 poise. 6
- 3 (a) State and explain factor's affecting compaction of soil. 4

OR

- (a) (i) Smooth wheel roller
(ii) Sheep foot roller.
- (b) Describe light compaction test to determine OMC and MDD for a soil in laboratory. 6
- (c) The following are results of standard compaction test performed on a sample of soil. 6

Water content % :	5	10	15	20	25
Bulk density (g/cm^3) :	1.70	1.96	2.15	2.21	2.14

Plot water - content - dry density curve and obtain optimum water-content and maximum dry density. Calculate the water content necessary to completely saturated the sample and its maximum dry density, assuming no change in the volume. Take ($G= 2.7$)

SECTION - II

- 4 (a) Attempt all the questions :
- (i) Define Darcy's law for permeability. 2
- (ii) Equipotential lines cross flow lines at ____ angle. 1
- (iii) The ____ stresses are only that acting on principal planes. 1
- (iv) The falling head permeability test is used for clayey soil. Whether the statement is true or false. 1
- (v) The maximum depression of water table due to pumping is known as the ____ 1

(vi) The shear strength of soil is defined by _____ and _____ 2

(vii) Write equation to determine co-efficient of consolidation. 2

(b) Determine average permeability of stratified soil mass when flow is parallel to bedding plane and perpendicular to bedding plane. 6

OR

(b) Explain in brief : 6

(i) Seepage velocity and discharge velocity.

(ii) Exit gradient and critical gradient

(iii) Assumption and validity of Darcy's law.

(c) In a constant head permeability test the following observations were taken : 6

Distance between peizometer tapings= 250 mm

Difference of water levels in peizometers= 60 mm

Diameter of test samples = 100 mm

Quantity of water collected = 425 ml

Duration of the test = 5 min

Determine the coefficient of permeability of soil.

5 (a) Explain Tarzaghi's theory of one-dimensional consolidation. 6

OR

(a) Explain spring analogy to understand consolidation phenomenon of soil mass. 6

(b) Determine preconsolidation pressure for soil mass. 4

(c) In a consolidation test the following results have been obtained. When the load was changed from 50 kN/m², the void ratio changed from 0.70 to 0.65. Determine the coefficient of volume decrease, m_v and compression index, C_c . 6

6 (a) Describe the triaxial test with neat sketch. 6

OR

(a) Describe box shear test with sketch. 6

(b) The stresses at failure on the failure plane in a cohesionless soil mass were: 6

Shear stress = 4kN/m² ; normal stress = 10 kN/m².

Determine the resultant stress on failure plane, the angle of internal friction of the soil and angle of inclination of the failure plane to the major principle plane.