QP Code : 5678

(3Hours)

Max Marks=80

Note 1. Attempt any 4 out of six questions
　　　 2. Question 1 is compulsory
　　　 3. Assume any suitable data where ever required

Q.1　　　Attempt any four

　　a.　Discuss the merits and demerits in direct shear and Tri axial test　　　　　05

　　b.　Enlist the assumptions made in Terzaghi's one dimensional consolidation theory　　05

　　c.　The mass specific gravity of fully saturated clay having a water content of 36% is　　'05
　　　　1.89. On oven drying the mass specific gravity drops to 1.72. Calculate the specific
　　　　gravity of clay and its shrinkage limit.

　　d.　Explain briefly uses of flow nets　　　　　05

　　e.　Explain briefly Proctor's needle method for compaction control in field　　　　　05

　　f.　Derive the expression for coefficient of permeability for stratified soils in horizontal　　05
　　　　and vertical directions

Q.2　a.　Arrive the relation between γ, G, e & S stating from basics　　　　　05

　　b.　There are two borrow areas A & B which have soil with void ratio of 0.8 and 0.7　　10
　　　　respectively. The in place water content is 20% and 15% respectively. The fill at the
　　　　end of construction will have the volume of 10,000m³, γ is 2Mg/m³ and placement
　　　　water content is 22%. Determine the volume of soil to be excavated from both the
　　　　areas .G=2.67. the cost of excavation and transportation for A is 200/100m³ and
　　　　220/100m³ for borrow pit B . State which borrow pit is economical

　　c.　Define (i) Density index (ii) Sensitivity (iii) Degree of saturation (iv) flow index (v)　　05
　　　　consistency index

Q.3　a.　Define Stoke's law explain the corrections applied for hydrometer analysis　　　　　06

　　b.　Briefly explain the design features for sampler for getting undisturbed samples　　　06

　　c.　The liquid limit of clay soil is 56% and plasticity index is 15%　　　　　08
　　　　　(i)　　In what state of consistency is this material at water content of 45%
　　　　　(ii)　　What is the plastic limit of soil
　　　　　(iii)　　The void ratio of soil if the minimum volume reached on shrinkage is 0.88
　　　　　　　　what is the shrinkage limit if its G=2.71

　　　　　　　　　　　　　　　　　　　　　　　　　　　P.T.O

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Q.4   a.   Classify the soil as per IS classification system having liquid limit 40% plasticity   05
index 10%, percentage passing 4.75mm sieve is 60% and percentage passing 75μ
sieve is 45%

     b.   A granular soil deposit is 7m deep over an impermeable layer. The ground water table   07
is 4m below ground level. The deposit has a zone of capillary raise of 1.2m with
saturation of 50%. Plot the variation of total stress, pore water pressure and effective
stress with e=0.6 G=2.65

     c.   Mention the field tests for finding coefficient of permeability and explain briefly   08
pumping out test for unconfined aquifer

Q.5   a.   A 1.25m layer of soil n=0.35, G=2.65 subjected to upward seepage head of 1.85m   07
.what depth of coarse sand would be required above the existing soil to provide a
factor of safety of 2 against piping? Assume that coarse sand has same porosity and
specific gravity as soil and there is negligible head loss in sand.

     b.   Explain briefly the effect of compaction on engineering properties of soil   06

     c.   The undrained Tri axial tests were conducted to failure on three specimen of clayey   07
silt with pore pressure measurements as shown

Sno.	Major stress(kN/m^2)	Minor Stress(kN/m^2)	Pore pressure(kN/m^2)
1	157	17	12
2	204	44	20
3	225	55	22

Determine the shear parameters consisting shear strength of soil also determine how
much increase or decrease of these parameters would be computed if the pore pressure
is neglected

Q.6   a.   A 3M thick clay layer beneath a building overlain by a permeable stratum and   06
underlain by impermeable rock .the coefficient of consolidation of clay was found to
be 0.025cm^2/minute. Final expected settlement for the layer is 8cm.

         (i)   How much time will it take for 80% consolidation to occur
         (ii)   Determine the time required for 2.5cm settlement to occur
         (iii)   Compute the total settlement that would occur in one year

     b.   Explain briefly the procedure for pull out test performed on geotextiles   04

     c.   Explain briefly any one of the graphical methods performed for soil investigation   05

     d.   Describe any one of the fitting methods for finding coefficient of consolidation   05