53 (CE 403) GTEN

2014

GEOTECHNICAL ENGINEERING

Paper : CE 403

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* What do you understand by residual soil ? 5

(b) Two clays *A* and *B* have the following properties. 15

	Clay *A*	Clay *B*
Liquid limit (%)	44	55
Plastic limit (%)	20	35
Natural moisture Content (%)	30	50

Which of the clay *A* or *B*,

(i) Would experience larger settlement under identical loads.

(ii) is more plastic

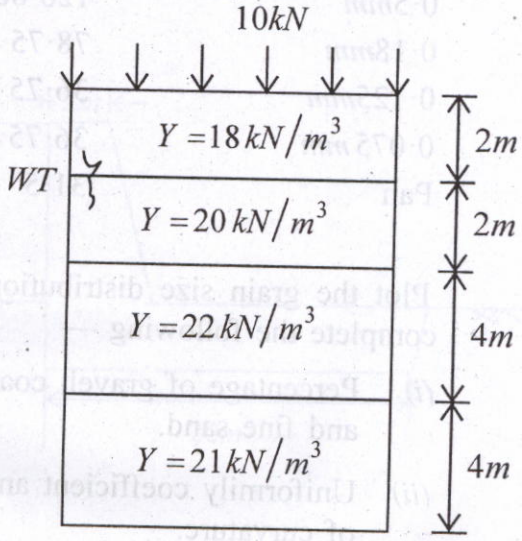
(iii) is softer in consistency ?

2. (a) How force of attraction are related to orientation, induction and dispersion effect ? 6

(b) A partially saturated sample from a borrow pit has a natural moisture content of 15%, bulk unit weight of $1{\cdot}9 g/cc$, weight of solids is unity and $G = 2{\cdot}7$. Determine the degree of saturation and void ratio using a phase diagram. 14

3. (a) What are the agencies responsible for physical and chemical weathering ? 6

(b) Draw the effecting stress, pore pressure and total stress diagram for the given stratum. 14



4. Sieve analysis of a given sample of sand were carried out. The total weight of sand used for the analysis was 500g. The following information were obtained. 20

Sieve Size	Weight retained (gm)
4·75mm	25·75

Sieve Size	Weight retained (gm)
$2{\cdot}0\,mm$	$61{\cdot}75$
$1{\cdot}0\,mm$	$67{\cdot}00$
$0{\cdot}5mm$	$126{\cdot}00$
$0{\cdot}18mm$	$78{\cdot}75$
$0{\cdot}125mm$	$36{\cdot}75$
$0{\cdot}075\,mm$	$36{\cdot}75$
Pan	$31{\cdot}5$

Plot the grain size distribution curve and complete the following —

(i) Percentage of gravel, coarse, medium and fine sand.

(ii) Uniformily coefficient and coeffident of curvature.

5. *(a)* Describe complexity of soil nature ? 5

(b) A sample of wet silty clay soil has a mass of $126kg$. The following data were obtained from Laboratory test on the sample, wet density $\rho = 2{\cdot}1\,g/cm^3$, $G = 2{\cdot}7$, $w = 15\%$.

Determine 15

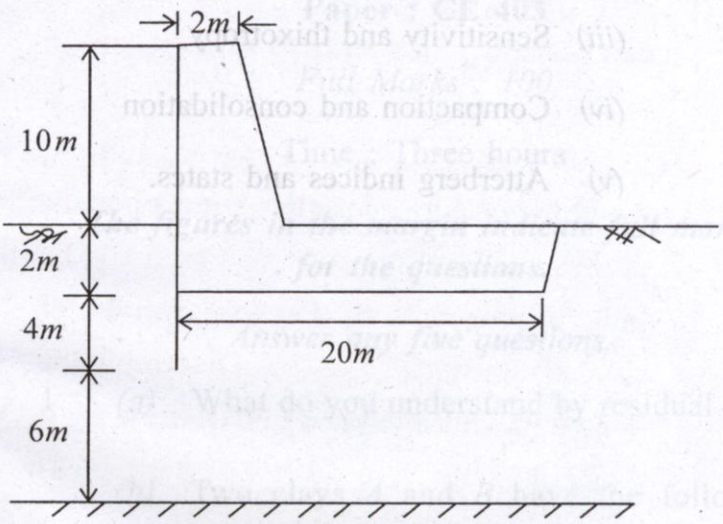
(i) Dry density

(ii) Porosity

(iii) Void ratio

(iv) Degree of saturation

6.



Compute — 20

(i) Seepage flow below the dam.

(ii) Total head, pressure head and uplift pressure at point P which is $2m$ away from the sheet pile on the downstream side and is lying at the base of the dam.

(iii) The unit gradient.

7. Differentiate between : 20

(i) Loose packing and dense packing of soil

(ii) Soil grain property and soil aggregate property.

(iii) Sensitivity and thixotropy

(iv) Compaction and consolidation

(v) Atterberg indices and states.