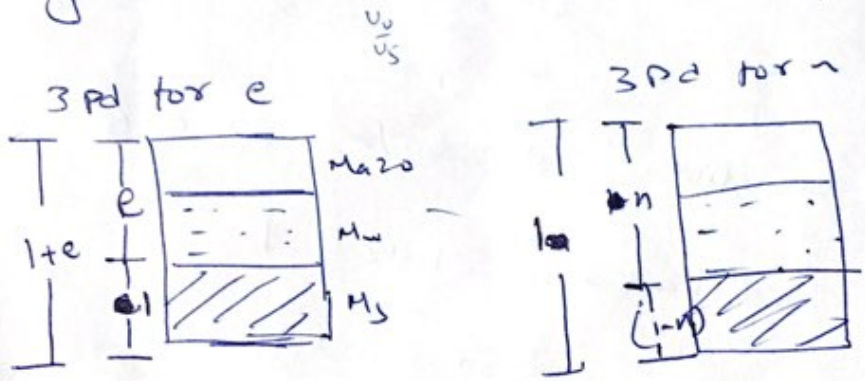
Geotech

Section A

a) Dispersive Clay are a particular type of clay which erodes in presence of water by process of deflocculation.

Calicle is a sedimentry rock, a hardened natural cement of calcium carbonate that binds other materials such as gravels, sand clay & silt.

b)



now for both dia left side indicates volume

$\therefore$ Void ration = $\frac{\text{volume of voids}}{\text{volume of solids}}$

$= \frac{e}{1}$ from 3 pd from e.

Void ration = $\frac{\text{volume of voids}}{\text{volume of solids}}$

$= \frac{n}{1-n}$ from 3 pd of n

---

also. we know $n = \frac{V_v}{V}$

$n = \frac{V_v}{V_v + V_s}$

taking reciprocal

$$\frac{1}{n} = \frac{V_v + V_s}{V_v}$$

$$\frac{1}{n} = \frac{V_v}{V_v} + \frac{V_s}{V_v}$$

$$\frac{1}{n} = 1 + 1/e$$

$$\frac{1}{n} = \frac{e+1}{e}$$

$$n = \frac{e}{1+e}$$

or $e = \frac{n}{1-n}$

c) now Given $a_c = 60\%$ or 0.6

we know $S + ac = 1$

$S + 0.6 = 1$

$S = 0.4$

or $S = 40\%$

d) Bulky particles

when length, width & thickness are of same order of magnitude it called bulky shape

Elongated

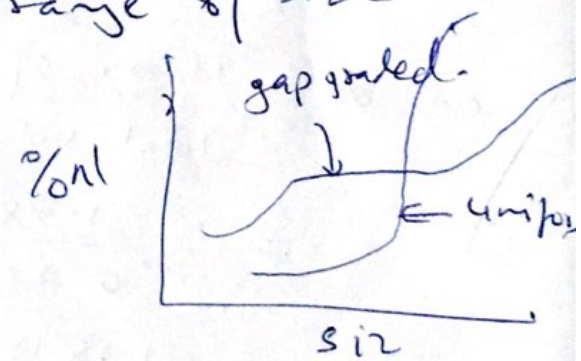
when length is greater than width. ($\epsilon = L/B$) elongnes

Flaky:
when thickness is least than both length and width.

Flatness = S/T

e) Gap graded: when in PSDC certain sized particles are missing. Flat curve.

Uniform graded: when all particles are lie in a very short range of size. generally steep curve.



Section B

a) $M = 2.035\,kg$
$w = 0.19$
$V = .995\,Ltr$

$\rho = \frac{M}{V} = \frac{2.035}{.995} = 2.037$

$\rho_d = \frac{\rho}{1+w} = \frac{2.037}{1+.19} = 1.7$

$e = \frac{G\gamma_w}{\rho_d} - 1 = \frac{2.8}{1.71} - 1 = 0.6$

$S = Gw/e = \frac{2.8 \times .19}{.63} = .8$

$\rho_d = \frac{(1-n_a)G\rho_w}{1+wG} \Rightarrow n_a = 0.$

b) Stoke law & limitations

as per notes.

(10 Pg) c) Derivations as per notes

$V_{natural} = 1000\,ml$

$V_{max} = 1370\,ml$

$V_{min} = 840\,ml$

$$D = \frac{V_{max} - V}{V_{max} - V_{min}} \times 100$$

$$= \frac{1370 - 1000}{1370 - 840} \times 100$$

$$= \frac{370}{530} \times 100 = 69.81\%$$

d) Procedure of Hydrometer test

as per notes

Section C

Q3) a) i) as per notes

ii) as per notes.

b) as per notes.

Q5) a) Mass of wax = 700 − 700 = 10 gm

Vol of wax = $\frac{10}{0.91 \times 1}$ = 10.98 ml

Vol of soil = 360 − 10.98 ml

= 349.01 ml

Bulk density = $\frac{700}{349.01}$ = 2.00 gm/ml

dry density = $\frac{2.00}{1+w}$ = $\frac{2.00}{1+.24}$ = 1.65 gm/ml

$1+e = \frac{G\gamma_w}{\rho_d} = \frac{2.7}{1.65} = 1.62$

$\Rightarrow e = 0.62$ (62%)

$S = \frac{Gw}{e}$

$S = \frac{2.7 \times .24}{.62}$

= 0.9145 (91.45%)

b) Methods of water content as per notes.