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Q.1 P=①

Q:1 WEATHERING :-

(a) It is a disintegration of larger rocks into smaller pieces by some external or internal agents. The rocks from which soil is formed is called Parent rocks.

⇒ TYPES :-

There are Two types.

1) MECHANICAL :-

It is fragmentation of parents rock by physical forces such as those resulting from temp stresses, from the formation of ice, wind, running water ect.

2) CHEMICAL :-

In chemical weathering, the parent rocks are converted into new minerals by chemical.

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Q.1 P=(2)

reaction / action. water and CO2 from atmosphere plays significant role in this type of weathring.

Q:1
(b) POROSITY: (n)

It is ratio of volume of voids in a given sample to the total volume of soil sample. It may be expressed in Percentage or in a decimal

$$n = \frac{V_v}{V} \times 100$$

$$n = \square\ \%$$

VOIDS RATIO:- (e)

It is the ratio between volume of voids and volume of solids in a given soil sample. Its denoted by small "e"

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Q.1 P=(3)

$$e = \frac{\text{volume of voids}}{\text{volume of solids}}$$

$$e = \frac{V_v}{V_s}$$

⇒ WATER Content :-

It is defined as the ratio of the weight of water to the weight of soil solids [dry weight of soil] in a given soil sample.

$$W_{total} = \frac{W_w}{W_s}$$

⇒ Specific Gravity of soil Solid ($G_s$)

In soil mechanics specific gravity generally refers to the specific gravity of soil solids and is defined as the ratio of the unit weight of water of

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Q1 P = (4)

of the same volume at 4°

$$G_{1s} = \frac{\gamma_s V_s}{\gamma_w V_w}$$

$$G_{1s} = \frac{W_s}{W_w}$$

= DEGREE OF SATURATION:-

It is ratio of volume of water present in the voids of given soil sample to the Total volume of soil

$$S_r = \frac{V_w}{V_v}$$

It is usually expressed in percentage

It is also called Percent saturation

Its volume ranges from 0 to 1 or 0 — to 100 Percent.

$S_r = 1$ for saturated soil

$S_r = 0$ for Fully dry soil.

$$S_r = \frac{V_w}{V_v} \quad -(A)$$

$$V_v = V_w + V_a$$

$$V_v = V_w$$

$$S_r = \frac{V_w}{V_w} \Rightarrow S_r = 1$$

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# Q.2 P=1

Q.2

(a) Moist/wet mass = 210g → 0.21kg

Dry mass = md = 160g = 0.16kg

Volume = V = 100 (m³

$G_s$ = 3.0

w = ?

γ = ?

$\gamma_d$ = ?

(i) $w = w_w / w_d$

Mass of water = $m_w$ = m − md

= 210 − 160 = 50g

= 0.05kg

$W_w = m_w g = 0.05 \times 9.81$

= 0.49N

$W_d = 0.16 \times 9.81 = 1.56N$

$w = \frac{0.49}{1.56} \times 100 = 31.41\%$

(ii) $\gamma = \frac{W}{V}$

$V = \frac{0.21 \times 9.8}{100 \times 10^{-6}}$

$\gamma = 20601 N/m^3$

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Q.2 P=(2)

(iii) $\gamma_d = \frac{W_d}{V}$

$\gamma_d = \frac{0.16 \times 9.8}{100 \times 10^{-6}}$

$\gamma_d = 15.7 \times 10^3 \ N/m^3$

⇒ Question No (2) Part (b) ⇐

Part (b)

Sol:- $W = \frac{W_w}{W_d}$

$w = \gamma_w$
$\gamma = \frac{W}{V}$
$W = \gamma V$

$W = \frac{W_w}{W_s} \Rightarrow \frac{\gamma_w V_w}{\gamma_s V_s}$

$W = \frac{V_w}{\left(\frac{\gamma_s}{\gamma_w}\right) V_s} \rightarrow (A)$

but $\frac{\gamma_s}{\gamma_w} = G_s$

& Also $S_r = \frac{V_w}{V_v}$

$V_w = S_r \times V_v$

eq (A) $W = \frac{S_r \cdot V_v}{G_s \cdot V_s}$

$W = \frac{S_r}{G_s}\left(\frac{V_v}{V_s}\right)$

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Q.2 P=(3)

$$w = \frac{S_r}{G_s} e$$

$$e = \frac{w G_s}{S_r}$$

If soil is saturated

$$S_r = 1$$

$$e = w G_s$$

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Q.3 P=(1)

Q. "3" CONSISTENCY Limits:

The moisture/water content at which a fine grained soil changes from one state of consistency to another state of consistency are termed as consistency limits or Atterberg Limits there are three atterberg limits.

(1) LIQUID LIMIT: ($w_2$)

It is a moisture content at which soil changes from plastic to Liquid state and vice versa

(2) PLASTIC LIMIT: ($w_1$)

It is a moisture content at which soil changes from its plastic state to semi solid state and vice versa. for lab determination plastic limit is a m.c at which a siol will just begin to

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Q.3 P=(2)

crumble (cracks) when rolled into a thread of approx $\frac{1}{8}$" in diameter.

(3) SHRINKAGE LIMIT :- $w_s$

It is a moisture content at which soil changes from its semi solid state to solid state and vice versa. it is a moisture content at which soil attains constant volume i.e no reduction in volume on further drying.

(4) PLASTICITY :

It is defined as the Property of soil due to which it can be rapidly deformed without rupture, and without elastic rebound

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Q.3 P=(3)

(5) PLASTICITY INDEX:-

The difference between liquid limits and plastic limits is called Plasticity INDEX

$$P.I = LL - PL \text{ (Expressed as +ve value)}$$

PI gives the range within which soil shows plastic properties. On the basis of P.I various codes/ oblique organization has divided soil into non plastic, high plastic and very high plastic.

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