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Section "B"

Subject = Geo technical and Foundation Engin

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QNo 2(a) Name the forces acting on dam. Explain any five of them in detail. 1)

1) water pressure: It is the pressure of water that acts perpendicular on the upstream face of the dam.

2) uplift pressure or Seepage loads.

When the water is stored on the upstream the water side of a dam there exists a head of water equal to the height up to which the water is stored. it is essential to study the Natural of uplife and also some methods will have to be reduced the uplift pressure value.

3). Self weight of dam:

the weight of dam and its foundation a major resisting force it can be computed using the following: as

$w = \gamma m$ volume

$\gamma m =$ unit weight of dam material.

4) Self pressure:

the weight of dam and its foundation a major resisting force it act at h/3 from the base and can be compided using equation of active earth.

5) wave pressure:

wave is generated on the surface of reservor by the blowing wids which exert a pressure on the upper part of the dam above the water level this pressure. is calculated using $Pw = 2.4\gamma w h w$

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B) part::

Soil Lique faction::

Soil lique faction occurs when saturated or partially saturated soil substantially loses strength and stiffness in response to an applied stress such as shaking during an earth quake or other sudden change in stress condition. In which a solied behave material that is ordinarity a like a liquid. in soil machanics the term "liquefied" was 1st by alfen Hagen. In refrence to the 1918 failure of the calaveras dam in california. He described the mechanism of flow liquefaction.

2) Buttress dam::

= A budress dam or hollow dam is a dam a solied, water-tight up stream side that is supported at internals on the down stream side by a series of buttress or supports.

3) **Infinit Slopes:** the type of slope 4)

Octanding in finitness or up to an entend whose boundries are not well defined.

4) **pier foundation:**

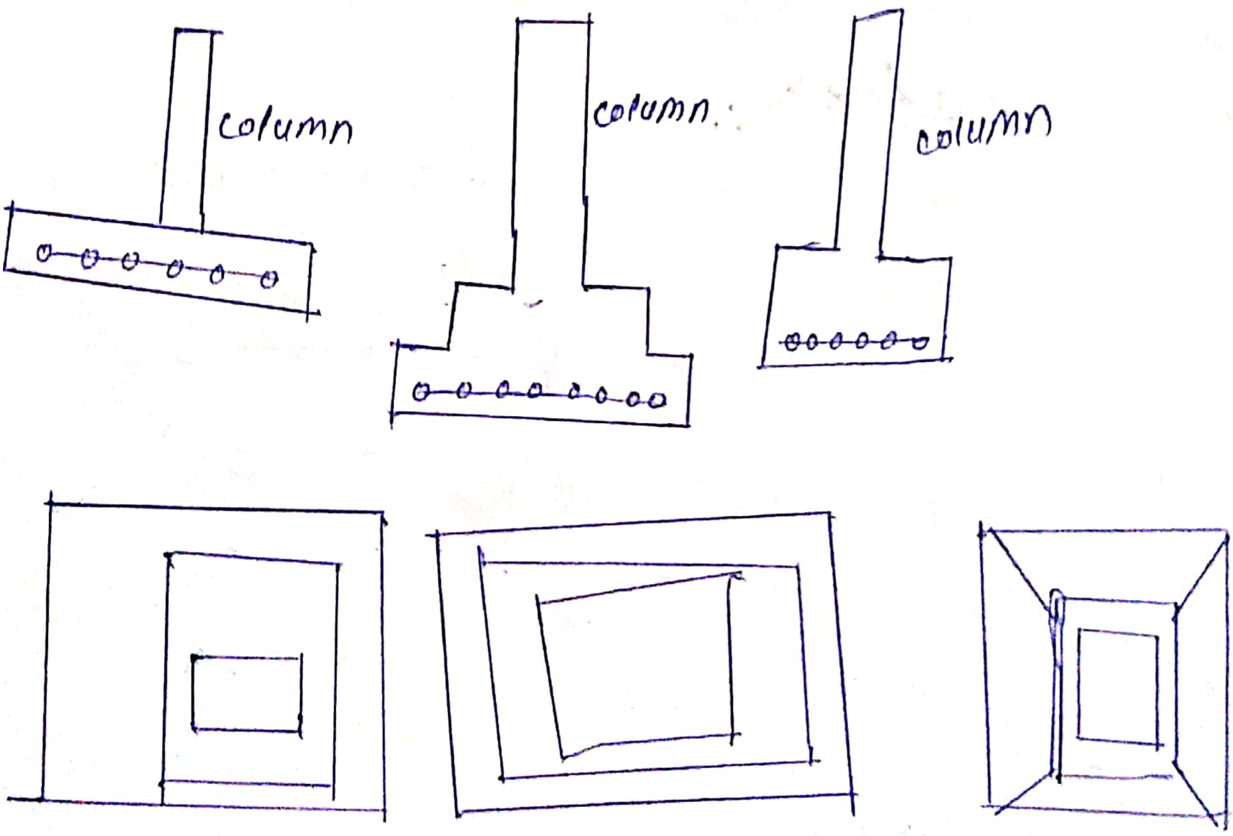
A pier foundation is a collection of large diameter cylindrical colums to support the supper structure and transfer Large sper-imposed load to the from Strata below.

5) **Dyamic load:** is any force that change with time such as car tyres peaple working. and went gusts. usually in structores engineering we tread these as stratic load.

Q No:2 Define Shallow Foundation 5)

Explain types of Shallow Foundation dealil.

A Shallow Foundation is a types of building Foundation that tranfer builing loads to the earth very near to the surface rather than to other surface larger or a range of depths as does a deep Foundation.



Shallow Foundation.

⇒ Different types of Shallow foundation 6) are

Skrip foundation:: are the types of foundation that are used to provide contains level (or some time stepped) strip of support to a linear structure such as wall or closely spaced rows of colums buits contraly above them.

Rapt Founatation:: It is also called met foundation is essentially a continous slab resting on the soil that extends over the entire foot print of the buildings and transferring its weight to the ground.

Spreact footings:: It is defined as the structural members used to support the column and wall as wall and distriubate the laod coming on the Structure to the Soil beneath it.

combined Footings:: are constructed for two or more colums when they are close to each other and their foundation is to transmit the foundation load from the Structure to the underlying Soil.

QNo.2 parts (B)

GROUND Improvement Techniques::

Ground improvement techniques are the techniques which are used to enhance the engineering property of soil beal heavy structural load. the main properties are Shear Strength permeability bealing capacity etc.

Methods of Ground Improvement Techniques.

1) Removal and Replacement of Soil::

this is an aldset and Simple method. this method is performed an loose soil.
In this method the unsuitable Soil is replaced

with computed fill. In this method the same soil is used to refill the higher compaction and better engineering properties this methode is Applicable above the groundwater table.

2) Dynamic compaction::

this method is used to increase the bearing capacity of soil this also increase the consolidation rate. this method also increase the density of soil to this method actually densityfication of soil take place.

VIBRO compaction::

It is also called vibro densificati. In this method the compaction take place at a certain depth in granual soil through vibratory probe. this vibratory probe is run by an electric enhance by ejecting water at the tip of probe.

Rapid Impact compaction. Impact energy is applied to surface of graind as a result of which densification of soil take place. up to a depth of 15 feet. this Impact energy is actually applied through hydroulic ramp.

WETSOIL MAXINGS:: In this method of ground Improvement technique a post of cement is prepared or inserted in the soil. this method is used to improve the characteristics of using cementation binder.

QNO 3::

Given data::

$c = 25 \, kN/m^2$

$\phi = 16^\circ$

$G = 2.73$

$e = 0.50$

Required::

F-O-S when soil is dry = ?

F-O-S when there is a seepage = ?

Solution::

$$F_c = \frac{c}{\gamma_d \times H \times \sin i \times \cos i} + \frac{\tan\phi}{\tan i}$$

By Relation::

$$\gamma_d = \frac{G_s \times \gamma_w}{1+e} \Rightarrow \frac{0.73 \times 9.8}{1+0.5}$$

$\gamma_d = 17.8 \, kN/m^3$

$$Fc = \frac{25}{17.8 \times 6 \times \sin(16^\circ) \times \cos(16)} + \frac{\tan(16^\circ)}{\tan(76^\circ)}$$

$Fc = 1.18$

When there is Seepage of water

$$Fc = \frac{C}{\gamma \cdot H \times \sin i + \cos i} + \frac{\gamma'}{\gamma} + \frac{\tan\phi}{\tan i}$$

$\gamma' = \gamma - \gamma w$

$$= \frac{2.72 + 0.5}{1 + 0.5} \times 9.5$$

$\gamma = 21.04 KN/m2$

$\gamma' = \gamma - \gamma w = \gamma 1.04 - 9.8$

$= 11.24 KN/m3$

$$Fc = \frac{\gamma s'}{21.04 \times 6 \times \sin(26^\circ) \cos(26)} + \frac{11.24}{21.04} + \frac{\tan(16)^\circ}{\tan(26^\circ)}$$

$Fc' = 0.816$

Result:

Fc when Soil is dry $= 1.18$

Fc when the is seepage $= 0.816$

QNo4:: Part (a)

Given data::

Height = 10m

$c = 18.8 \, kN/m^2$

$\gamma = 17 \, kN/m^3$

$\phi = 20^\circ$

F.O.S = 1.5

$F\phi = 1.0$

Required::

Inclination, $i = ?$

Solution::

$$SN = \frac{c}{F.O.S \times \gamma \times H}$$

$$= \frac{18.8}{1.5 \times 17 \times 10}$$

$$\boxed{SN = 0.073}$$

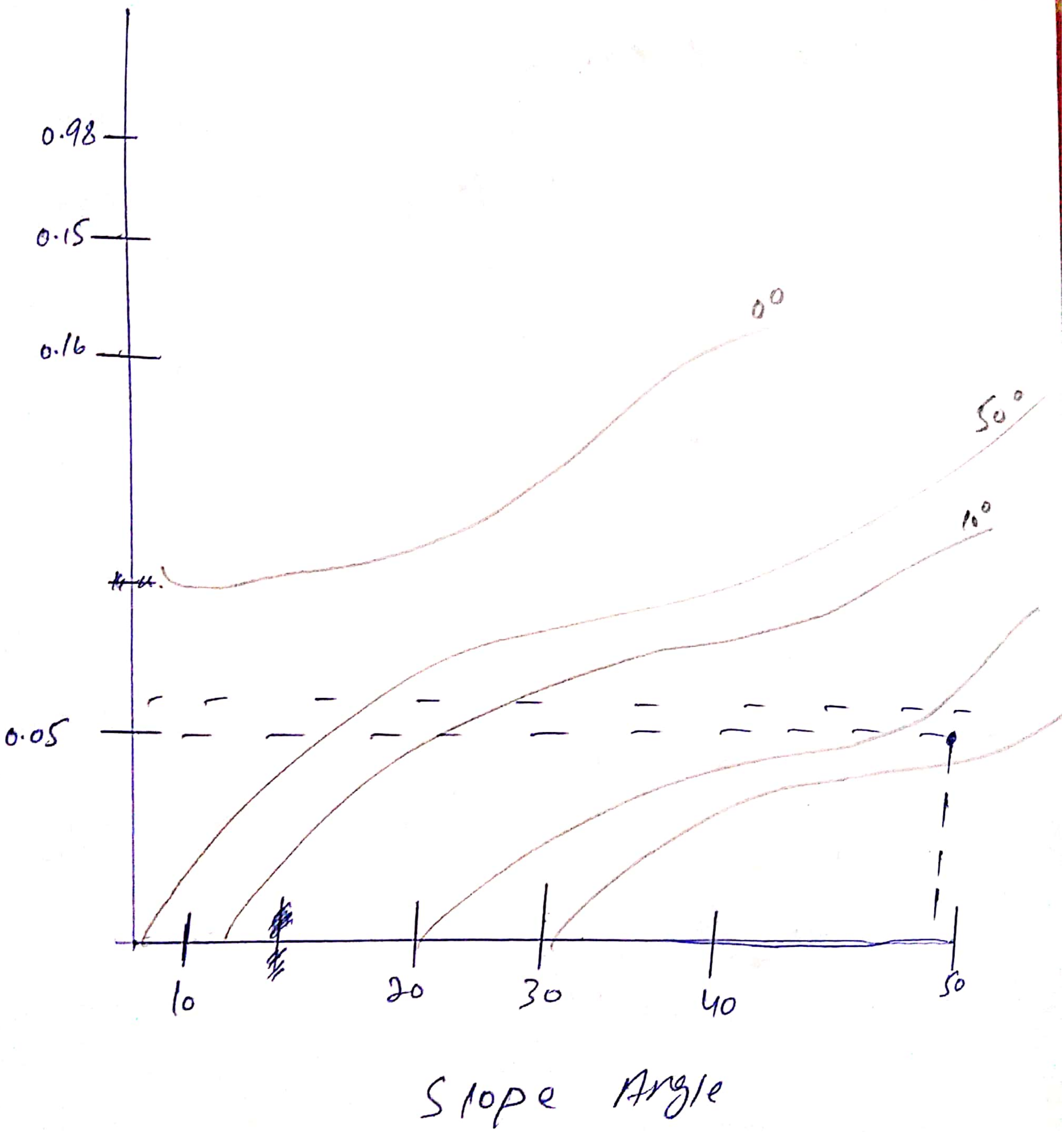
using taylor chart for

$\phi = 20^\circ$

$SN = 0.073$

$$\boxed{i = 44^\circ}$$

Part [illegible](A)



Q No 4 Part (B):

Given:

Height of water on upstream side = 15m

Bottom, width = 12m

Top width = 6m

γ water = 1000 kg / m²

γ concrete = 1450

γ silt = 1330 kg/m²

θ = 35°

Free Board = 3-5m

H = 2.5m

Required

Sill, pressure P_1 = ?

Solution:

As we know

$$P_b = \frac{\gamma_w \times H^2}{2} \times \frac{1 - \sin\theta}{1 + \sin\theta}$$

14)

$$ps = \frac{1330 \times 2.5^2}{2} \times \frac{1 - \sin 35^\circ}{1 + \sin 35^\circ}$$

$$= \frac{1330 \times 2.5^2}{2} \times 0.27$$

$$= 4156.25 \times 0.27$$

$$= 1122.18 \text{ kg/m}$$

RESULT:

Sill pressure, ps = 1122.18 kg/m

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