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Section = B

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Q No 01 - (a) :

Name the forces Acting on dam. Explain any five then in detail.

Answer.

Dam :- A Dam is a barrier that impounds water or underground Stream they Serve the purpose of retaining water.

forces acting on dam:-

the forces acting on dam are

1. water pressure.
2. uplift pressure.
3. Silt pressure.
4. wave pressure.

P-T-O

5- ice pressure.

6- Weight of Dam.

Water pressure :-

Water pressure (P) is the most Major External force acting on such a dam. the horizental water presseure exertal by weight. of Wated stored on upstram side of the dam can be Estimated from rule of hydrostatic pressure distribution

$P = \frac{1}{2} \gamma H_1^2$ acting H/3 from base.

uplift pressure :- water seeping through the ~~f~~ pores. crack and frssures of foundation material and water seeping

through dam body and then to the bottom through joint between the body of dam. It is second major external forces.

Earthquack forces:-

it the dam is to be desinged, is to be located in a region which is ~~possible~~ susceptible to earthquack allowance must be made for stress generated by earthquackes.

- An earthquack produce wave which are capable of shaking the earthquack upon which the dam is resting.

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Water pressure :-

Wave are generated on surface of reservioer by blowing winds, which cause of pressure towards the downstream side. Wave pressure depends upon the wave height, Wave height may be given by

$H_w = 0.032\sqrt{v.f} + 0.763 - 0.271(f)^{3/4}$

for $f < 32$ KM

$H_w = 0.032\sqrt{v.f}$ for $f > 32$ Km

H_w = height of water.

v = Wind velocity Km/hr

ice pressure :- the ice pressure may be formed on the surface of reservioer in cold countries, may sometimes melt and

P.T.O.

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expand. the force act linerly along the length of the dam and reservioir level. Magnitude of forces varies from 250 to 1500 KN/m².

Q No 1 (b)

Define the following.

liquification of soil :-

soil liquification occur when a saturated or ~~partially~~ partially saturated soil substantially loss length. and stiffness in response to an applied stress such as shaking during an earthquack or other sudden change in stress condition, in which materialy, a solid behave like liquide.

P-T-O.

Butress dam :-

A buttress dam or hollow dam with a solid water tight upstream side that is supported at interval on downstream side by series of buttress or support. the down wall may be straight or curved.

Inflinite Slope :-

the type of slope extending inflinitely or up to an extent whose boundries are not well defined. for this type of ~~slope~~ slope the soil properties for all depth below the surface are same.

p-T-o

pier foundation :-

A pier foundation is collection of large diameter cylinesical colums to support the superstructure and Transfer large loads. It is also known as post foundation.

Dynamic load :-

A dynamic load is any force that chariges with time. Such as car tyres, people walking and gusts. Usually is structural engineering we theat there as static load.

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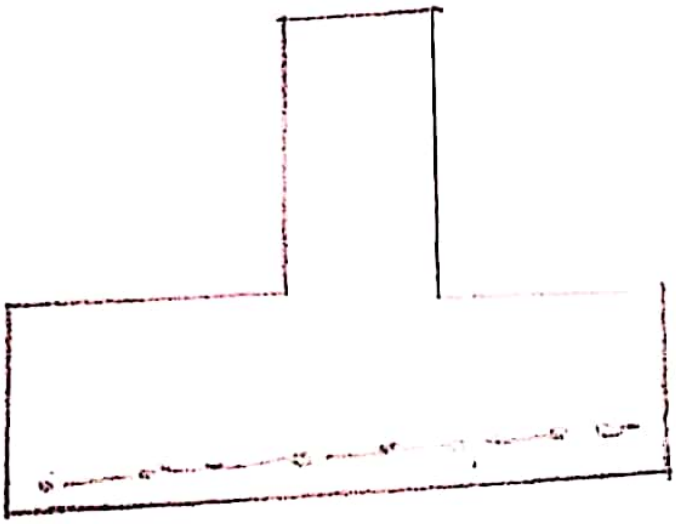
Question - No - 02 »

Deffine shallow foundation. Explain type of foundation.

Answer:

Shallow foundation:- A shallow foundation is a type of building foundation that Transfer building load to the earth very near to the surface.



types of Shallow foundation:-

① Strip foundation.

② Raft foundation.

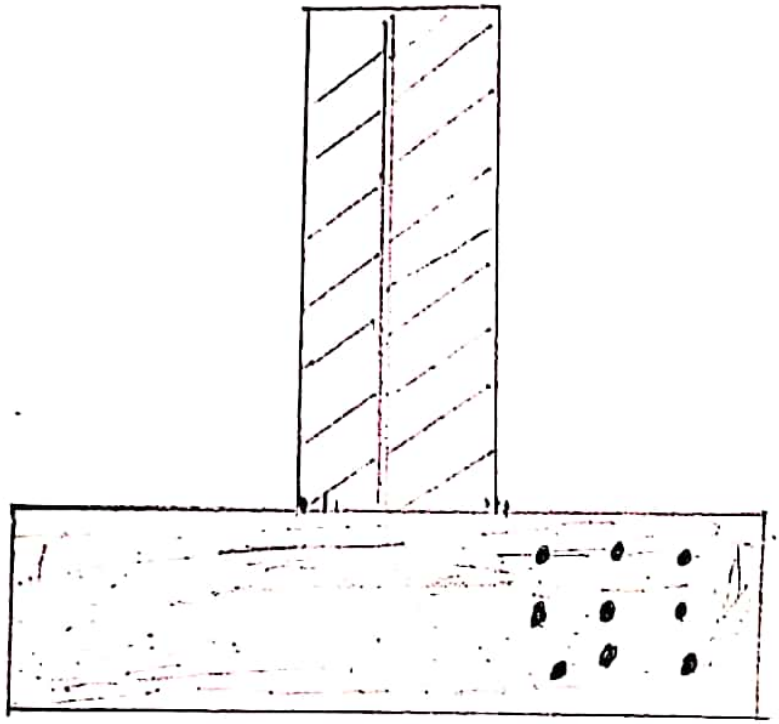
③ combined foundation.

Strip foundation:-

,strip foundation are type of shallow foundation that are used to provide a continous, level strip of support linear structure such as wall ar closely - Spaced row of colum built centrally above them.

p-T-o-

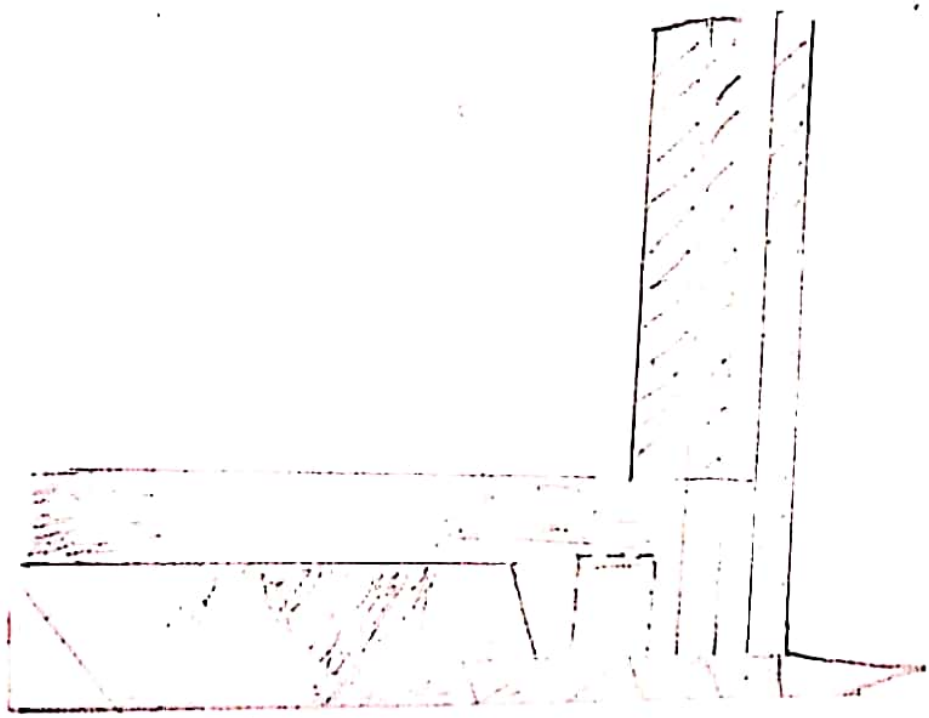
Strip foundation :-



Raft Foundation :-

Raft foundation :-

A raft foundation, also called a mat foundation is essentially a continous slab resting on the soil extend over the entire footprint of the Building and transfering it's weight to the ground.



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Question No 2 (b)

Why ground Important technique are important Explain five method of ground improvement in detail along with appropriate Sketch.

Answer:-

Ground Improvement technique:-

ground improvement technique are the technique used to enhance the engineering property of soil in order to bear heavy structural load. the main properties are Shear strength. permeability. healing capacity and stiffness etc.

Method of ground improvement Techniques

Removal and Replacement of Soil:-

P-T-O

this is an oldest and simple method. This method is performed on loose soil. in This Method the unsuitable soil is replaced with compacted fill. in this method the same soil is used the refill in higher compaction and better engineering properties.

⇒ Dynamic compaction:-

This method is used to increase bearing capacity of soil. This also increase consolidation rate.

⇒ Vibro compaction:-

It is also called vibro desinfiction. In this method compaction takes place at a certain depth in granular soil through vibratory probe. this vibratory probe is run by an elective motor.

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=> Rapid Impact Compaction :-

impact energy is applied to surface of ground as a result of which densification of soil, take place upto depth of 15 feet.

=> Dry mixing of Soil :-

Dry soil mixing is ground Improvement Technique by which the characteristic of weak soil are improved by using dry cementitious binder.

Q No - 03:-

Given Data:-

$C = 25\ KN/m^2$

$\phi = 16^\circ$

$G_1 = 2.73$

$\gamma = 0.50$

Required:- f.o.s when Soil is dry = ?

f.o.s When there is seepage = ?

Solution:-

$$fc = \frac{c}{\gamma d \times H \times \sin i \times \cos i} + \frac{\tan\phi}{\tan i}$$

By relation

$$\gamma d = \frac{G_s \times \gamma w}{1+e}$$

$$= \frac{2.72 \times 9.8}{1+0.5}$$

$$\gamma d = 17.8\ KN/m^3$$

$$f_c = \frac{25}{17.8 \times 6 \times \sin(26^\circ) \times \cos(26^\circ)} + \frac{\tan(16^\circ)}{\tan(26^\circ)}$$

$$f_c = 1.18$$

When the is Seepage of Water

$$f_c = \frac{c}{\gamma \cdot H \times \sin i \times \cos i} + \frac{\gamma'}{\gamma} + \frac{\tan\theta}{\tan i}$$

$$\gamma' = \gamma - \gamma_w$$

$$\gamma = \frac{G_1 + e}{1+e} \times \gamma_w$$

$$= \frac{2.72 + 0.5}{1 + 0.5} \times 9.8$$

$$\gamma = 21.04 \ KN/m^3$$

$$\gamma' = \gamma - \gamma_w$$

$$= 21.04 - 9.8$$

$$= 11.24 \ KN/m^3$$

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$$f_c = \frac{25}{21.04 \times 6 \times \sin(26^\circ)\cos(26^\circ)} + \frac{11.24}{21.04} + \frac{\tan(16^\circ)}{\tan(26^\circ)}$$

$$f_c = 0.816$$

Result :-

f_c when soil is dry = 1.18

f_c when there is seepage = 0.816

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Question - No - 04 :- (a)

Given :-

Height = 10 m

$C = 18.8\ KN/m^2$

$\gamma = 17\ KN/m^2$

$\phi = 20^\circ$

$f \cdot 0.S = 1.5$

$f\infty = 1.0$

Required :-

Inclination, $i = ?$

Solution :-

$$SN = \frac{C}{f \cdot 0.5 \times \gamma \times H}$$

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

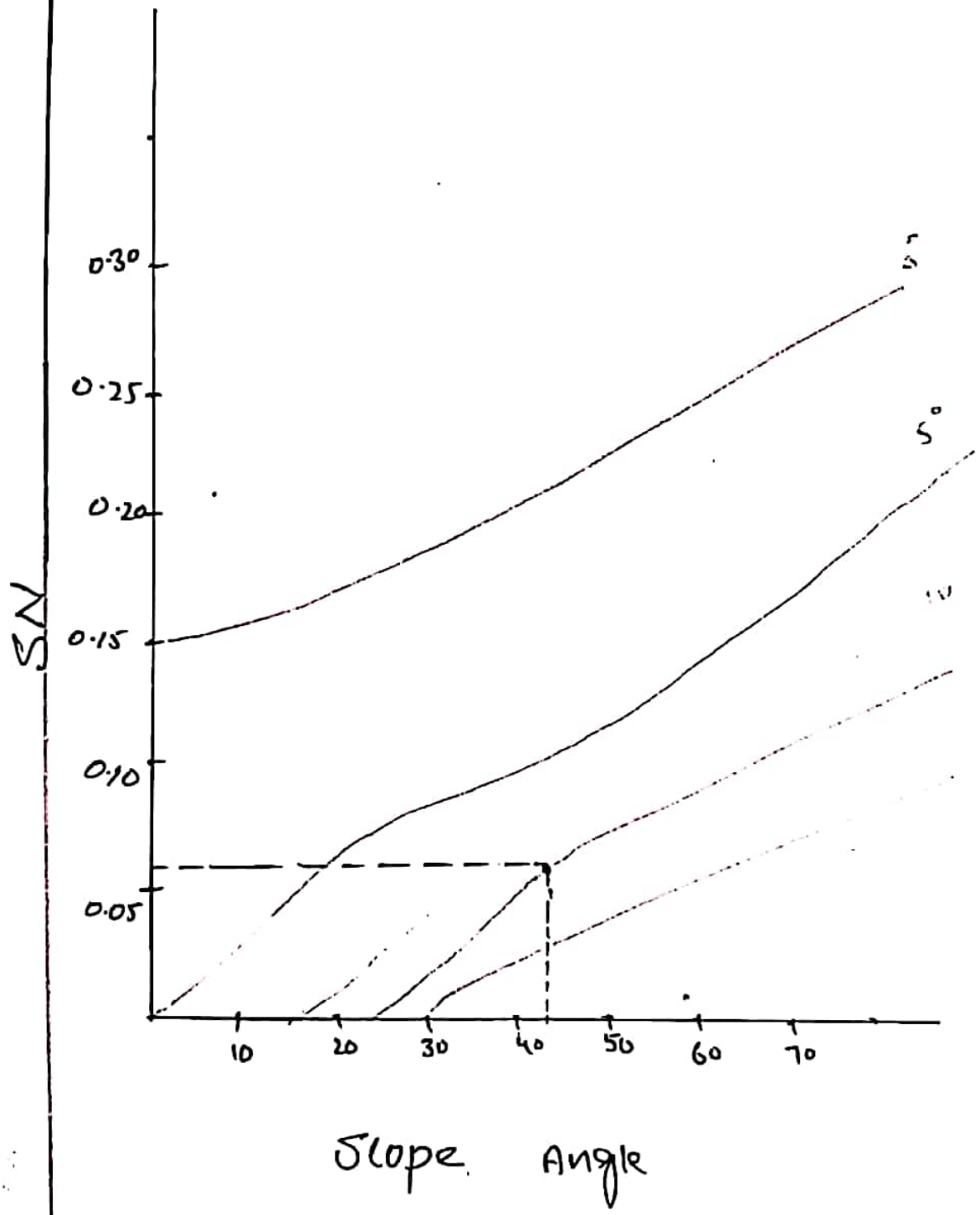
$$SN = 0.073$$

using taylor chart bar

$\phi = 20^\circ$

$SN = 0.073$

$i = 44^\circ$



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Q No 4 - (b)

Given:- height of water on upstream side = 15m Bottom. Width = 12m

Top Width = 6m

$\gamma_{water} = 1000\ kg/m^3$

$\gamma_{concrete} = 1450$

$\gamma_{silt} = 1330\ kg/m^3$

$\theta = 35^\circ$

free board = 3.5m

$H = 2.5m$

Req = Silt pressure $P_s = ?$

Solution:-

AS We KNOW

$$P_S = \frac{\gamma_{silt} \times H^2}{2} \times \frac{1 - \sin\theta}{1 + \sin\theta}$$

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

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

$$= 4156.25 \times 0.27$$

$$P_S = 1122.18 \text{ Kg/m}$$

Result:

Silt power, $P_S = 1122.18$ Kg/m