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Section	A
Seemester	6th
Subject	Geotechnical and foundation.

Q1A 1

QNo 1A Name the force acting on dam explain any five of them in detail:.

Ans Gravity dam.
water pressure
uplift. pressure
earth quake forces
Silt pressure
wave pressur
Ice pressure
weight of Dam.

water pressure
water pressure is one of the mass major external forces acting on gravity dam the horzontal water pressure exerted by the water stored on upstream side of dam can be collected from hydrorostatic pressure distribution.

uplift pressure:.
wate seeping through the pores and fissures of the foundation material and water through the dam of the body and there to bottom through the joint between a body of the dam and and it foundation at the base exerts an uplift pressure on the base of dam.

3- earth quake forces:-
An earth quakes produce waves which are capable of shaking the dam in every possible direction. the effect of earthquake is equivalent to imparting an acceleration to the foundation of the dam in the direction in which the wave is travelling ta the moment acceleration can be splitted into 2 component.

-> Horizantol Acceleration $a_h = k_h \times g$

-> vertical Acceleration $a_v = k \times g$

4- Silt pressure:-
if 'h' is the height of silt deposited The force exerted by the silt in addition to external water pressure can be represented by Rankine's formula.

$P_{silt} = \frac{1}{2}$ ysub h^2 ka and act at h/3 from base

5- Ice pressure:-
The ice which may be formed on the water Surface of the reservoir in cold countries may sometimes melt and expand the dam faced then has to resis force exerted by the expanding ice the force act linear along the length of the dam and at the reservoir level the magnitude of this force vaires from 2500 - 1500 kn/m^2.

Q1B1

Q NO 1B Difine the following terms.

1) liquification of soil:-
effective stresses are the stresses which keep the soil particles in contact with each othe if the effective stresses decrease the soil loose it strength when the effective stresses state.

2) Butress Dam:..
A buttress dam is a dam with a solid water tight upstream side that is soffested at intervals on the downstream side by a serics of buttresses or supports the dam wall may be straight or curved most buttress dam are made of reinforced concrete and. are heavy pushing the dam into gravity.

3) infinite slope:.
The slop which have infinit depth such a slop is called infinit slope.
example:. Natural slop which have Hills mountain desert etc.
In infinit slope the failure will be in the from of sliding.

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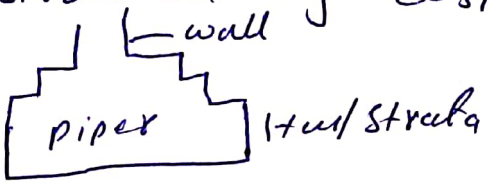
4- Dier foundation:.
The vertical member which have larger dia as compared to pile and transmit the load of structure to the underground soil they are constructed by cast in situ proces



5- Dynamic load

Dynamic load occur when loading condition are changing with time ~~if~~ may be is the from of earth quake oleration of heavy machinery wave motion wind etc Due to dynamic load the Settlement Chances may mereage.

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Qno 2A | Define Shallow foundation explain types of Shallow foundation in detail.

Ans

Shallow foundation :-

According to terzaghi:

The foundation in which depth of the foundation is less an equal to width of the foundation is called shallow foundation

$$Df \leq B$$

According to Sicempton:

The foundation in which Df/B ratio is less than as equal to 2.5 than then the foundation is called shallow foundation.

Types of shallow foundation.

wall / strip footing.

The footing which runs ocress the length of the wall and transfer the load of the wall to the soil safty it is called wall or strip footing.

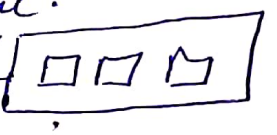
Q2#2

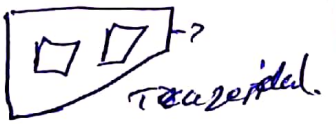
2 combined footing:-

The footing which is constructed for two or more column and transfer the load of the two or more column to the soil safety then it is called combined footing.

if the load of column is uniform then the combined footing will be rectangular in shape.

if the load of the column is not uniform then shape of combined footing will be trapezoidal.





3 RAFT/MAT footing:-

The footing which covers the whole area of the structure is called raft footing this type of footing is proposed in area which have soil weak in bearing capacity this is also provided when the load of super structure is heavy.

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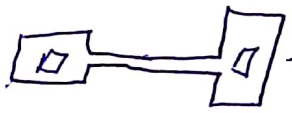
Q.A 3

4 Strapped footing The footing ~~Beam/strap~~ in which the outer column is connected with the inner column by mean of the beam or strap is called footing



5 column/Isolated footing.

The footing which is constructed for a single column and transmit it load to the soil safety. it may be circular square rectangular in shape.

6 Stepped footing.

The footing which have step in all direction or in all sides is called as Stepped footing

Qn 2 B why ground improvement in detail along with appropriate Sketch

Ans Ground improvement techniques:-

Ground improvement techinques are the techniques which are used to enhance the engineering property load in order to heal heavy structulal load the main properties are steal strength permeability bearing capacity and stiffness etc.

need of Ground Improvement Techniques.

The Soil which volometric changes takes place due to shrinkage and swelling such Soil need ground improvement techniques.

- The Soil which is organic in nature
- The Soft Soil which also require ground improvment techniques.
- The Soil which is Sandy dump place also required ground improvement techniques

methodes of Ground Improvement Techniques.

1 Removal and Replacement of Soil.

This is an oldest and simple method this method is performed on loose Soil.

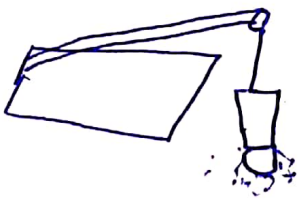
In this method the unsuitable soil is replaced with compacted fill In this method the same soil is used to refill the higher compaction and better engineering properties.
This method is applicable above the ground water bable.

2- Dynamic compoction :- 

this method is used to increases the The bealing capacity of soil this also increase the consolidation rate this method also increase the dusity of soil In this method actually densification of soil take place.

3- VIDRo compaction:-

it is also called vibro densification In this method the compaction ✱ takes place at a certain depth in granular soil through vibratory probe. this vibratory probe is ran by an eledric motor the penetration of probe is entance by ejecting water at the tip of probe.



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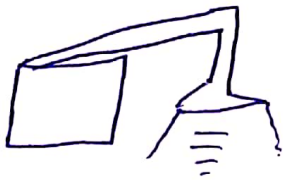
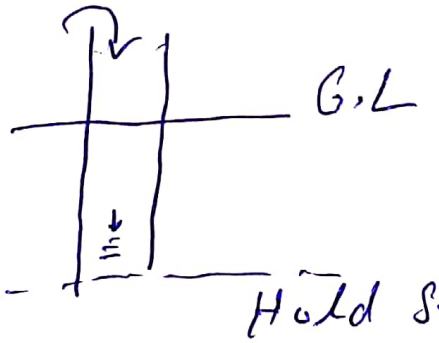
4 Rappid impact compaction:
impact energy it applied to surface of ground as a result of which densification of soil take place upto a depth of 15 feet.
This impact energy is actually applied through hydraulic ramp the hydraulic ramp weight values from 4-8 tons.



5 Vibro Concrete Column.

Vibro concrete column is a ground improvement techniques which transfer the load from weak Strata to hold strata by using Strength concrete.



e10 Q3 1

Q3 An infinitely long slop having ---------- what factor of Safety would result.

Given Data:

$C = 2.5\ kN/m^2$

$\phi = 16^\circ$

$G = 2.72$

$e = 0.50$

Required:

Fc (F.O.S) when Soil is dry.

fe (F.O.S) when that is seepage in Soil

Solution:

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

i) $\gamma_d = \frac{G_s \times \gamma_w}{1+e} = \frac{2.72 \times 9.8}{1+0.5}$

$\gamma_d = 17.8\ kN/m^2$

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

$\Rightarrow$ Fc 1.18

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Q32

when there is seepage of water

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

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

$$\gamma = \frac{G + e}{1 + e} * \gamma w = \frac{2.72 + 0.5}{1 + 0.5} \times 9.8$$

$$\boxed{\gamma = 21.04 \text{ kN/m}^2}$$

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

$$21.04 - 9.8$$

$$\boxed{\gamma = 11.24 \text{ kN/m}^3}$$

$$Fc \quad \frac{25}{21.04 \times 6 \times \sin(26) \times \cos 26} + \frac{11.24}{21.04} \times \frac{\tan(16)}{\tan 26}$$

$$\boxed{Fc = 0.816}$$

QNo 4A Given data.

Height = 10cm

$C = 18.8 kN/m^2$

$\gamma = 17 kN/m^2$

$\phi = 20$

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 char for

$\phi = 20$

$SN = 0.073$

$i = 44°$

e 12

No 4b Given data

-> Height water on upstream side = 15m
-> Bottom width of the dam = 12m
-> Top width = 6m
-> unit weight of concrete = 1450 kg/m2
-> unit weight of water = 100 kg/m2
-> unit weight Silt = 1330 kg/m2
-> Angle of friction to the Silt = $\phi = 35^\circ$
-> free Board = 3.5m
-> Silt Deposit height = 2.5m.

Required,

Silt pressure = ?

Solution

As we knowthat

$$P_s = \frac{\gamma_s \times H_1^2}{2} \times \frac{1 - \sin\alpha}{1 - \sin\alpha}$$

$$P_s = \left(\frac{1330 \times 12.5}{2}\right)^2 \times \frac{1 - \sin 35^\circ}{1 - \sin 35^\circ}$$

P_s = 11.26.30 kg/m

$$P_s = 1126.30 \text{ kg/m}$$