

Q No 1:

A:

When a project encounters difficult foundation conditions best possible solution is to ~~Rem~~ excavate, Remove and replace unsuitable soils with borrow excavation materials having good or required engineering properties.

Water stopping property and permeability of soil can be modified through additives.

Bentonite cement grout is used for such purpose.

On water stopping, grout will include a lot of bentonite and little cement. On consolidation works, grout will contain a lot of cement and little bentonite.

Soft gels are also used for water stopping purposes.

Soft gels give considerable

(2)

reduction in permeability of soil.

Silicate based grouts are sodium silicate in liquid form diluted and containing a reagent. It is also used for modification of soil properties.

Q No 01:

B:

Dewatering is the term for the control of ground water by pumping.

On construction sites it may be known as 'Construction dewatering'.

The method is also used on mine sites - 'mine dewatering'.

The process of dewatering can be defined as - pumping from wells or sumps to temporarily lower ground water levels, to allow excavations to be made in dry and stable conditions below natural ground water level.

As an alternative to ground water control by pumping, physical cut-off walls can be installed around a site to exclude ground water.

Different techniques widely used for dewatering purposes are

- (1). Open Dewatering
- (2). Well point dewatering.
3. Deep well dewatering
4. Gravel Sump pumping.

Less commonly used dewatering techniques are

- Horizontal well points
- Relief wells.
- Artificial Recharge.
- Ground water remediation.

1. Open dewatering System:

It enables one to lower the groundwater table adequately in cohesive and low permeable soils.

Water is pumped off directly from sumps (ditches) along the toes of the slopes of the excavation works.

2: Well Point dewatering System:
It enables one to lower the groundwater table adequately for deep and large construction sites.
It has proven to be very flexible system.

3: Deepwell dewatering:
It enables one to lower the groundwater table to a considerable depth. A submersible pump is installed at the bottom of the well.
The water is raised from the well by a multi-staged pump.

4. General Sump Pumping:
Sump pumps are used in applications where excess water must be pumped away from a particular area.

Q.No (02)

(A):

Soil Nailing is a technique to reinforce and strengthen ground adjacent to an excavation by installing closely spaced steel bars called 'nails', as construction proceeds from top to down.

It is an effective and economical method of ~~constructing~~ ^{excavation support}, support of hill cuts, bridge abutments and highways.

Different types of Nails used are

a) Driven nails, Grouted nails
Corrosion protected nails,
Jet grouted nails, Lunched nails.

Soil nailing can be used in stiff to hard grained soils, dense to very dense granular soils with some apparent cohesion, weathered rock with no weakness planes and glacial soil etc.

Q: NO (02)

B:

Grout can be defined as a solution, an emulsion or suspension in water, which will harden after a certain time interval.

It can be divided into two main groups:

Suspension grout: (having cement)

Solution grout: (Chemical products in a solution or emulsion).

Initially, its application confines mainly in voids filling, water stopping and consolidation.

Nowadays, it extends to alleviate settlement of ground caused by basement and tunnel excavation works, to strengthen ground so that it can be used as a structural member or retaining structure in solving geotechnical problems.

Q No (03):

(A):

Ground improvement refers to a technique that improves the engineering properties of the soil mass treated.

Usually, the properties that are modified are shear strength, stiffness and permeability.

Thus it is increasingly important for the engineer to know the degree to which soil properties may be modified.

Ground improvement techniques can be used for following conditions

- a) Mechanical properties of soil are not adequate
- b) Swelling and shrinkage
- c) Collapsible soils
- d) organic and peaty soils
- e) Sands and gravelly deposits
- f) Handling dredged materials etc, etc.

QNo (03)

(B):

Expansive soils are those having excessive swelling clay minerals.

The presence of such swelling clay minerals in soils can cause excessive swelling when the soil comes into contact with water and also shrinkage when it undergoes drying.

Suitable ground improvement techniques must be adopted before using such soils for engineering purposes.

Q No (04):

(A):

Stone Columns and blasting are two of the ground improvement techniques.

Stone columns act as reinforcement for soil. It increases resistance of soil to movement.

Vibrations and displacements produced by stone columns installation and blasting

cause densification of soil and increase in lateral stresses in surrounding soil.

Blasting is most effective in loose sands that contain less than 20% silt and less than 5% clay.

Q.No 4:

B:

Different admixtures can be used for the improvement of engineering properties of black cotton soil.

However, among these, lime stabilization of black cotton soil is most common and economical.

General problems associated with black cotton soil are

- a) High compressibility
- b) Swelling
- c) Shrinkage
- d) Engineering properties like permeability, plasticity etc.

Lime stabilization helps in increasing the strength, durability and also minimizes the moisture variations in the soil.

It has been observed experimentally that an addition of 4% lime decreases liquid limit by 12.1% and 6% addition of lime shows a decrease of 17.7%.

(3)

CBR value of soil also increases with addition of lime.