UNIT I – SOIL CLASSIFICATION AND COMPACTION

Part A -2 Mark Questions & Answers

1. Define soil?

Weakly cemented accumulation of mineral and organic particles and sediments found above the bedrock, or unconsolidated material consisting of discrete solid particles with fluid or gas in the voids.

2. Define Soil Mechanics.

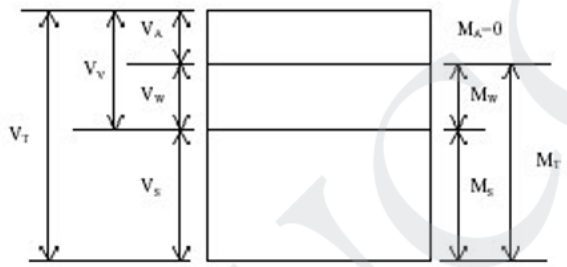
According to (ASTM) Soil Mechanics it is define as the application of the laws and principles of mechanics and hydraulics to engineering problems dealing with soil as an engineering material.

3. List the Main Types of Soils

The types of soil are

Granular : gravel, sand, (silt)
Cohesive : (silt), clay
Organic : marsh soil, peat, coal, tar sand
Man-Made : mine tailings, landfill waste, ash, and Aggregates.

4. Draw the phase diagram



5. Define soil Index

$$I_D = \frac{e_{max} - e}{e_{max} - e_{min}} \times 100\%$$

Where,

emax = maximum void ratio corresponding to the loosest state,
emin = minimum void ratio corresponding to the densest state, and
e = void ratio of the sample.

6. Give an empirical correlation between PSD and permeability.

An empirical correlation between PSD and permeability has been developed

$$k = c\,(D10)^2 \text{ cm/s}$$

Where 100 < c < 150 Developed by Hazen for uniform, loose, clean sands and gravels.

7. Define degree of saturation.

The degree of saturation is defined as the ratio of volume of water to the volume of voids.

8. Define Void Ratio

The void ratio of a soil is defined as the ratio of volume of voids to the volume of solids.

9. Define specific gravity.

It is defined as the ratio of the mass of a given volumes of solid gains to the mass of equal volume of water at the same temperature

10. Define Density

The density of a substance is the mass per unit volume of that substance. For water this is denoted by w, and its value is about 1000 kg/m3. Small deviations from this value may occur due to temperature differences or variations in salt content. In soil mechanics these are often of minor importance, and it is often considered accurate enough to assume that w = 1000 kg/m3.

11. Define water content.

The water content is another useful parameter, especially for clays. It has been used in the previous chapter. By definition the water content w is the ratio of the weight (or mass) of the water and the solids

W = Ww / Wp.

12. What are the factors that affect hydraulic conductivity?

The hydraulic conductivity is influenced by a number of factors including:

- Effective porosity
- Grain size and grain size distribution
- Shape and orientation of particles
- Degree of saturation
- Clay mineralogy

13. Write the different field of soil mechanics.

(i) Foundation design and construction
(ii) Pavement design
(iii) Design of underground structures and earth retaining structures
(iv) Design of embankments and excavatitions
(v) Design of earth dams

14. Write the different types of density of soil.

- Bulk density
- Dry density

- Density of solids
- Saturated density
- Submerged density

15. Define porosity.

The porosity of a given soil sample is the ratio of the volume of voids to the total volume of the given soil mass.

Soils usually consist of particles, water and air. In order to describe a soil various parameters are used to describe the distribution of these three components, and their relative contribution to the volume of a soil. These are also useful to determine other parameters, such as the weight of the soil. They are defined in this chapter. An important basic parameter is the porosity n, defined as the ratio of the volume of the pore space and the total volume of the soil,

16. What is meant by air content?

It is defined as the ratio of volume of air voids to the volume of voids.

$$Ac = (Va/Vv)$$

17. Define the term density index.

It is defined as the ratio of the difference between the voids of the soil in its loosest and its natural voids ratio e to the difference between the voids ratios in the loosest and densest states.

It is used to express the relative compactness of a natural cohesion less soil deposit.

18. Write the index properties of soil.

- Water content
- Specific gravity
- Particle size distribution
- Consistency limits
- In situ density
- Density index

19. Give the methods to find out the water content of a soil sample.

- Oven drying method
- Sand bath method
- Alcohol method
- Calcium carbide method
- Pycnometer method
- Radiatition method
- Torsion balance method

20. Write the four stages of atterberg liquid to solid state.

- Liquid state
- Plastic state

- Semi solid state
- Solid state

21. Write the uses of atterberg limits.

These are most useful for engineering purposes are liquid limits, plastic limit and shrinkage limits.

22. Define plasticity.

It is the property of a soil which allows it to be deformed rapidly without rupture, without elastic rebound and without volume change.

23. Write the general classification of soil.

- Particle size classification
- Textural classification
- Highway research board classification
- Unified soil classification and IS classification

24. Define compaction.

It is a process by which the soil particles are artificially rearranged and packed together into a closet state of content by mechanical means in order to decrease the porosity of the soil and thus increase its dry density.

25. What are all the factors affecting the compaction.

- Water content
- Amount and type of compaction
- Type of soil
- Addition of admixtures.

26. What is the significance of soil mechanics?

Soil mechanics has become a distinct and separate branch of engineering mechanics because soils have a number of special properties, which distinguish the material from other materials. Its development has also been stimulated, of course, by the wide range of applications of soil engineering in civil engineering, as all structures require a sound foundation and should transfer its loads to the soil.

The most important special properties of soils will be described briefly in this chapter. In further chapters they will be treated in greater detail, concentrating on quantitative methods of analysis.

27. What is Degree of saturation?

The pores of a soil may contain water and air. To describe the ratio of these two the degree of saturation S is introduced as

$S = Vw / Vp$

Here Vw is the volume of the water, and
Vp is the total volume of the pore space.

The volume of air (or any other gas) per unit pore space then is 1 - S.

If S = 1 the soil is completely saturated,

if S = 0 the soil is perfectly dry.

28. Define plastic limit.

The transition from the plastic state to the solid state is called the plastic limit, and denoted as wP . It is defined as the water content at which the clay can just be rolled to threads of 3 mm diameter. Very wet clay can be rolled into very thin threads, but dry clay will break when rolling thick threads.

The (arbitrary) limit of 3 mm is supposed to indicate the plastic limit. In the laboratory starting with a rather wet clay sample, from which it is simple to roll threads of 3 mm, performs the test. By continuous rolling the clay will gradually become drier, by evaporation of the water, until the threads start to break.

29. Define liquid limit.

The transition from the liquid state to the plastic state is denoted as the liquid limit, wL. It represents the lowest water content at which the soil behavior is still mainly liquid.

30. What are methods available for determination of k for a soil sample?

· Constant Head permeability test
· Falling Head Permeability Test
· Horizontal Capillary Test.

Part B-12 Mark Questions

1) Explain the sieve analysis test in detail.
2) Explain the two methods of determination of the coefficient of permeability in the laboratory.
3) Explain the liquid limit test.
4) Explain the method of determination of plastic limit in the laboratory.
5) Explain the procedure of determining the shrinkage limit in the laboratory.
6) Explain the Standard Proctor compaction test.
7) Explain in detail the classification of soil.
8) Explain the pycnometer method of determination of specific gravity of a soil mass.

UNIT II – EFFECTIVE STRESS AND PERMEABILITY

Part A -2 Mark Questions & Answers

1. What are assumptions made to derive the equation governing two dimensional steady state seepage?

Several assumptions are required to derive the equation governing two dimensional steady state seepage.

• The soil is completely saturated
• There is no change in void ratio of the porous medium
• The hydraulic conductivity is isotropic
• Darcy's law is valid
• The water is incompressible

2. What are the steps in the construction of a flow net?

Steps in Drawing a Flow Net

1) Define and clearly mark a datum.
2) Identify the boundary conditions (EP, FL, LCP).
3) Draw intermediate equipotentials and flow lines - draw coarse mesh with a few EPs and FLs
4) Verify the coarse mesh is correct.
   - Are the boundary conditions satisfied?
   - Are all flow tubes continuous?
   - Are EPs z FLs?
   - Mostly "squares" ?
5) Add additional EPs and FLs for suitable refinement of the flow net.
6) Calculate desired quantities of flow and heads.

3. Define Seepage velocity.

The actual velocity of water flowing through the voids is termed as seepage velocity.

4. What are the factors that affect the permeability of a soil mass?

Some of the factors, which influence permeability are

- Grain size
- Viscosity
- Temperature
- Void ratio

5. Give the formulae to determine the vertical stress, radial stress Tangential stress, & shear stress under a point load.

Vertical Stress $\sigma_z = \frac{3Pz^3}{2\pi R^3}$

Radial Stress $\sigma_r = \frac{P}{2\pi R^2} - \left[\frac{3r^2 z}{R^3} - \frac{(1-2v)R}{R+z}\right]$

Tangential stress $\sigma_\theta = \frac{P(1-2v)}{2\pi R^2}\left[\frac{R}{R+z} - \frac{z}{R}\right]$

Shear stress $\tau_{rz} = \frac{3Prz^2}{2\pi R^5}$

6. Define Permeability.

The ease with which water can flow through a soil mass is termed as permeability

7. What is laminar flow?

Flow of fluids is described as laminar if a fluid particles flow follows a definite path and does not cross the path of other particles.

8. Define quick sand

Sand is said to be quick sand condition when the flow is upward under a hydraulic gradient, which reduces the effective stress to zero.

9. What is Frost Heave?

Water migrates upward from the water table to the capillary fringe. When the atmospheric temperature falls to the freezing point & the ice is formed. This results in an increase in the volume of the soil. This is known as frost heave.

10. Give the Allen Hazens Formula

$$K=cD10^2$$

K - Co-efficient of permeability
D10 - Effective size (cm)
C - Constant with a value between 100& 500.

11. Estimate the value of k of a soil with an effective diameter of 0.2 mm.

$$K=cD10^2$$

C= 125, K= 125 x 0.02^2 = 0.05 cm/sec

12. What is Darcy's law?

For laminar flow in a homogeneous soil the velocity of flow (v) is given by

V= Ki

K = co-efficient of permeability

I - hydraulic gradient.

13. Define seepage.

Seepage is the flow of water under gravitational forces in a permeable medium. The flow is generally laminar.

14. List the assumptions made in the Laplace's equation

The following assumptions are made in the derivation of the Laplace equation.

- The flow is laminar.
- Water & soil are incompressible.
- Soil is isotropic & homogeneous.
- The soil is fully saturated.
- The flow is steady ie. flow condition do not
- Change with time.
- Darcy's law is valid.

15. Define soil water.

Water present in the voids of soil mass is called soil water.

16. What is meant by gravitational or free water?

It is the subsurface water that fills the voids continuously and is subjected to no forces other than the gravity. Hence this water also known as ground water.

17. Write the mode of occurrence of water in soil.

- Ground water
- Capillary water
- Adsorbed water
- Infiltrated water
- Pore water
- Solvate water
- Structural water

18. Define capillary.

It is the phenomenon of movement of water in the interstices of a soil due to capillary force is called capillary.

19. Briefly explain capillary force.

The minute pores of soil serve as capillary fuses through which the moisture rises above the ground water table. The capillary forces depends upon various factors such as

surface tension of water, pressure in water in relation to atmosphere and the size and conformation of soil pores.

20. Define surface tension.

It is the property which exists in the surface film of water tending to contract the contained volume into a form having minimum superficial area possible. The molecules on a surface of a liquid attracted by other molecules on a surface and inside the body of the liquid.

21. What are the rules to be followed while construction of flow net?

Rules for flow net construction

- When materials are isotropic with respect to permeability, the pattern of flow lines and
- Equipotentials intersect at right angles. Draw a pattern in which square figures are formed between flow lines and equipotentials
- Usually it is expedient to start with an integer number of equipotentials drops, dividing total head by a whole number, and drawing flow lines to conform to these equipotentials. In the general case, the outer flow path will form rectangular rather then square figures. The shape of these rectangles (ratio b/l) must be constant.
- The upper boundary of a flow net that is at atmospheric pressure is a "free water surface". Integer equipotentials intersect the free water surface at points spaced at equal vertical intervals.
- A discharge face through which seepage passes is an equipotentials line if the discharge is submerged or a free water surface if the discharge is not submerged. if it is a free water surface, the flow net figures adjoining the discharge face will not be squares.
- In a stratified soil profile where ratio of permeability of layers exceeds 10, the flow in the more permeable layer controls. That is, the flow net may be drawn for more permeable layer assuming the less permeable layer to be impervious. The head on the interface thus obtained is imposed on the less pervious layer for construction of the flow net within it.
- In a stratified soil profile where ratio of permeability of layers is less than 10, flow is deflected at the interface.
- When materials are anisotropic with respect to permeability, the cross section may be transformed by changing scale as shown above and flow net drawn as for isotropic materials. in computing quantity of seepage, the differential head is not altered for the transformation.
- Where only the quantity of seepage is to be determined, an approximate flow net suffices. If pore pressures are to be determined, the flow net must be accurate.

Part B-12 Mark Questions

1. Explain different modes of occurrences of water in soil.
2. Explain the term with a neat sketch surface tension.
3. Explain the factors affecting soil suction.
4. Describe in detail shrinkage and swelling of soils.
5. How the frost action will occur in the water.
6. Write a short note on slaking of clay and bulking of sand.
7. Explain in detail on factors affecting permeability.
8. Write a note on quick sand condition of soil.
9. Explain the method of capillary permeability test.
10. Explain the properties, uses & application of flow net.

UNIT III – STRESS DISTRIBUTION AND SETTLEMENT

PART-A

1. What is immediate settlement?

The settlement which is caused by the elastic deformation of dry soil and of moist and saturated soils without any change in moisture content.

2. What is primary consolidation settlement?

The settlement which results of volume change in the saturated cohesive soils because of expulsion of the water that occupies the voids space.

3. What are the approximate methods of determination of vertical stress under loaded areas?

- Equivalent point load method
- Two to one load distribution method
- Sixty degree distribution

4. What are the reasons for compression of the soil?

- Compression of solid particles & water in the voids.
- Compression & expulsion of air in the voids.
- Expulsion of water in the voids.

5. What are the stages of consolidation?

The stages of consolidation are

- Initial consolidation
- Primary consolidation
- Secondary consolidation

6. What is a principal plane?

At every point in a stressed body, there are three planes on which the shear stresses are Zero. These planes are known as principal planes.

7. What are the limitations of coulomb's theory?

The limitations of columb theory are

- It neglects the effect of the intermediate principal stress.
- It approximates the curved failure envelope by a straight line which may not give correct results.

8. Give the Coulomb's shear strength equation.

The Coulomb's shear strength equation is given by,

S= c + tan

C = cohesion
□ □= Angle of internal friction

9. What is Unconsolidated- Undrained condition?

In this type of test no drainage is permitted during the consolidation stage. The drainage is also permitted in the shear stage.

10. What is consolidated- undrained condition?

In a consolidated- undrained test, the specimen is allowed to consolidate in the first stage. The drainage is permitted until the consolidation is complete.

11. What is the main cause of slope failure?

Slope failures occur when the rupturing force exceeds resisting force.

12. What are the factors affecting permeability tests?

The following five physical characteristics influence the performance and applicability of permeability tests:
(1) Position of the water level,
(2) Type of material - rock or soil,
(3) Depth of the test zone,
(4) Permeability of the test zone, and
(5) Heterogeneity and anisotropy of the test zone.

13. Define effective stress.

Effective stress equals the total stress minus the pore water pressure, or the total force in the soil grains divided by the gross cross-sectional area over which the force acts. Define Critical Depth. If there is no distinct change in the character of subsurface strata within the critical depth, elastic solutions for layered foundations need not be considered.

Critical depth is the depth below the foundation within which soil compression contributes significantly to surface settlements. For fine-grained compressible soils, the critical depth extends to that point where applied stress decreases to 10 percent of effective overburden pressure. In coarse-grained material critical depth extends to that point where applied stress decreases to 20 percent of effective overburden pressure.

14. Write a note on piping.

Piping and Subsurface Erosion. Most piping failures are caused by subsurface erosion in or beneath dams. These failures can occur several operations. In essence, water that comes out of the ground at the toe starts a process of erosion (if the exit gradient is high enough) that culminates in the formation of a tunnel shaped passage (or "pipe") beneath the structure. When
the passage finally works backward to meet the free water, a mixture of soil and water rushes through the passage, undermining the structure and flooding the channel below the dam.

It has been shown that the danger of a piping failure due to subsurface erosion increases with decreasing grain size. Similar subsurface erosion problems can occur in relieved dry-docks, where water is seeping from a free source to a drainage or filter blanket beneath the floor or behind the walls. If the filter fails or is defective and the hydraulic gradients are critical, serious concentrations of flow can result in large voids and eroded channels.

15. Define stress path.

A convenient way to represent test results, and their correspondence with the stresses in the field, is to use a stress path. In this technique the stresses in a point are represented by two (perhaps three) characteristic parameters and they are plotted in a diagram. This diagram is called a stress path.

16. Give the introduction about stresses in soil.

Stresses are induced in a soil mass due to weight of overlaying soil and due to the applied loads. These stresses are required for the stability analysis of the soil mass, the settlement analysis of foundations and the determination of the earth pressures.

17. Write the assumptions made in the Boussinesq theoretical solutions.

- The soil mass is an elastic continuum, having a constant value of modulus of elasticity i.e., he ratio between the stress and strain is constant.
- The soil is homogeneous, i.e., it has identical properties at different points.
- The soil is isotropic, i.e., it has identical properties in all directions.
- The soil mass is semi – infinite.
- The soil is weightless and is free from residual stresses before the application of the load.

18. Write the assumptions made in the Terzaghi's theory of consolidation.

- The soil is homogeneous and isotropic
- The soil is fully saturated.
- The solid particles and water in the voids are incompressible. The consolidation occurs due to expulsion of water from the voids.
- The co efficient of permeability of soil has the same value at all points, and it remains constant during the entire period of consolidation.
- Darcy's law is valid throughout the consolidation process.
- Soil is laterally confined, and the consolidation takes place only in axial direction. Drainage of water occurs only in the vertical direction.
- The time lag in consolidation is due entirely to the low permeability of the soil.
- There is a unique relationship between the void ration and the effective stress and the relationship remains constant during the load increment.

Part B -12 Mark Questions

1. Explain core cutter method of determination of field density.
3. Explain the method of construction of Newark's Influence chart
4. Explain the consolidation test in detail.
5. Explain the laboratory method of consolidation test.
6. Explain the term with a neat sketch immediate and consolidation settlement.
7. Give short notes with neat sketch on pressure distribution diagrams.
8. Explain the method of Terzaghi's one dimensional consolidation theory.
9. Draw the diagram for various cases of drainage face and consolidation pressure distribution systems.

UNIT IV – SHEAR STRENGTH

Part A -2 Mark Questions & Answers

1. State the test to be conducted to find out the shear strength of a soil.

- Direct shear test
- Triaxial compression test
- Unconfined compression test
- Shear vane test

2. How can you divide the soil based on their shear strength?

- Cohesionless soil
- Purely cohesive soils
- Cohesive – fractional soils

3. Write a short note on shear.

In compression soils become gradually steer. In shear, however, soils become gradually softer, and if the shear stresses reach a certain level, with respect to the normal stresses, it is even possible that failure of the soil mass occurs. This means that the slope of sand heap, for instance in a depot or in a dam, can not be larger than about 30 or 40 degrees. The reason for this is that particles would slide over each other at greater slopes.

As a consequence of this phenomenon many countries in deltas of large rivers are very flat. It has also caused the failure of dams and embankments all over the world, sometimes with
Very serious consequences for the local population. Especially dangerous is that in very fine materials, such as clay, a steep slope is often possible for some time, due to capillary pressures
In the water, but after some time these capillary pressures may vanish (perhaps because of rain),
And the slope will fail. A positive application of the failure of soils in shear is the construction of
Guard rails along highways. After a collision by a vehicle the foundation of the guard rail will rotate in the soil due to the large shear stresses between this foundation and the soil body around it. This will dissipate large amounts of energy (into heat), creating a permanent deformation of the foundation of the rail, but the passengers, and the car, may be unharmed. Of course, the guard rail must be repaired after the collision, which can relatively easily be done with the aid of a tractor.

4. What is creep?

The deformations of a soil often depend upon time, even under a constant load. This is Called creep.

5. What is a principal plane?

At every point in a stressed body, there are three planes on which the shear stresses are zero. These planes are known as principal planes.

6. Define Mohr's circle.

It is a graphical method used for the determination of stresses on a plane inclined to the principal planes. The graphical construction is known as Mohr's circle.

7. State the merits of direct shear test.

- The sample preparation is easy. The test is simple and convenient.
- As the thickness of the sample is relatively small, the drainage is quick and the pore pressure dissipates very rapidly.
- It is ideally suited for conducting drained tests on cohesionless soils.
- The apparatus is relatively cheap.

8. State any four demerits of triaxial test

- The apparatus is elaborate, costly and bulky.
- The drained test takes a longer period as compared with that in a direct shear test.
- The strain conditions in the specimen are not uniform due to frictional restraint produced by the loading cap and the pedestal disc. This leads to the formation of the dead zones at each end of the specimens.
- The consolidation of the specimen in the test is isotropic, whereas in the field, the consolidation is generally anisotropic

9. Briefly explain unconfined compressive strength test.

The UCC test is a special form of a triaxial test in which the confining pressure is zero. The test can be conducted only on clayey soils which can stand without confinement. The test is generally performed on intact (non – fissured), saturated clay specimens. The test can be conducted in a triaxial test apparatus as s U – U test, it is more convenient to platform it in an unconfined compressive machine are as follows

- Machine with spring
- Machine with a proving ring

10. State the purpose of vane shear test

It is used to find the shear strength of a undrained soft clay.

11. Define stress path.

A stress path is a curve which shows the changes in stresses as the load acting on the soil specimen changes. Lambe's stress path is a commonly used stress path.

12. Give the types of stress path.

- Effective stress path
- Total stress path
- Total stress minus static pore pressure path

13. Define liquefaction of sand.

The phenomenon when the sand loses its shear strength due to oscillatory motion is known as liquefaction of sand. The structures resting on such soil sink. In the case of partial liquefaction the structure may undergo excessive settlement and the complete failure may not occur.

14. Give the factors affecting shear strength of cohesive soils.

- Structure of clay
- Clay content
- Drainage conditions
- Rate of strain
- Intermediate principle stress
- Repeated loading
- Confining pressure
- Plasticity index

Part B -12 Mark Questions

1. Write a detailed note on direct shear test.
2. Write a detailed note on Tri axial shear test.
3. What are the factors that influence the compaction of a soil mass?
4. What are all the factors that affect the permeability of a soil mass? Briefly Explain.
5. Explain with a neat sketch about vane shear test.
6. Explain UCC test.
7. Explain Mohr's stress circle for the shear strength of soil.
8. Explain in detail Mohr-Coulomb failure theory.

UNIT V – SLOPE STABILITY

Part A -2 Mark Questions & Answers

1. Define slide.

The failure of a mass of soil located beneath a slope is called a slide.

2. State the causes for failure of slope.

(i) The action of gravitational forces, and
(ii) Seepage forces within the soil.
(iii) Failure due to undercutting of its foot.
(iv) Failure due to disintegration of the structure of the soil.

3. Give the types of slope.

(i) Infinite slope
(ii) Finite slope

If a slope represents the boundary surface of a semi-infinite soil mass, and the soil properties for all identical depths below the surface are constant, it is called an infinite slope.

If a slope is of limited extent, it is called finite slope.

4. Enumerate the basic types of failure of a finite slope occurance.

(i) Slope failure
(ii) Base failure

5. Give the types of slip surfaces or failure surfaces

(i) Planner failure surface
(ii) Circular failure surface
(iii) Non- circular failure surface

6. Give the method of analysis for stability of a finite slope

(i) Culmann's method of planner failure surface
(ii) The Swedish circle method (slip circle method)
(iii) The friction circle method
(iv) Bishop's method

7. Give the controlling measures for slope protection.

The controlling measures for the protection of slope can be taken by
(i) Providing retaining wall on the side of filing
(ii) Providing good base course for the soil.
(iii) Making top surface as hard layer.

8. Define slope failure.

If the failure occurs along a surface of sliding that intersects the slope at or above its toe, the slide is known as slope failure.

9. Define face failure.

If the arc passes above the toe is called face failure.

10. Define toe failure.

If the arc passes through the toe is called toe failure.

11. Define base failure.

If the soil beneath the toe of the slope is weak the failure occurs along a surface that passes at someone distance below the toe of the slope. Such type of failure is called base failure.

12. Under what circumstances planar failure will occur?

Planar failure surface may commonly occur in a soil deposit or embankment with a specific plane of weakness. Excavation in stratified deposit quite often leads to a planar failure surface along a plane parallel to the strata.

13. How the stability of slope of an earthen dam will you analyze?

(i) Stability of downstream slope during steady seepage.

(ii) Stability of upstream slope during sudden drawdown.

(iii) Stability of upstream and downstream slopes during and immediately after the construction.

14. Give the forces acting on the sliding wedge in the friction circle method.

(i) The weight of the wedge

(ii) The total frictional resistance

(iii) Total cohesive resistance

Part B -12 Mark Questions

1. Explain the Swedish Circle method of Analysis of slopes.
2. Explain the friction Circle method of analysis of stability of slopes,
3. Explain the Culmann's method of analysis of stability of slopes.
4. Explain the Bishop's method of analysis of stability of slopes.
5. Explain with a neat sketch the slope failure mechanisms.
6. Give the method of slope protection measures. Explain briefly.