



MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Department of Civil Engineering Question Bank - Academic Year (2020-21)

Course Code & Course Name : 19CEC08 & Geotechnical Engineering

Year/Sem/Sec : II/IV/-

Unit-I : Soil Classification and Compaction

Part-A (2 Marks)

1. What are the different equipments available for compacting soil in the field?
2. List out the factors affecting compaction?
3. In a saturated soil mass, if water content is 24% and specific gravity of soil is 2.64, Estimate porosity.
4. Define porosity and voids ratio.
5. What are the effects of compaction on various properties of soil?
6. What is compaction curve?
7. Mention the classification systems of soil.
8. List various field compaction method along with their suitability.
9. Differentiate between void ratio and porosity.
10. The most accurate method for the determination of water content in the laboratory?
11. Define soil shrinkage ratio.
12. Define the terms plasticity Index and saturated mass density.
13. Define liquid limit
14. List out any four equipment/methods for field compaction of soil.
15. Draw the phase diagram for dry soil as saturated soil.
16. Define air contents and percentage air content in soil.
17. Derive the relationship between void ratio and porosity.
18. State whether the following statement is true or false and justify your answer. The efficiency of compaction improves with increase in compactive effort.
19. Define degree of saturation and shrinkage ratio.
20. What are the atterberg's limits? List it's types and it's importance.

21. Define compaction.
22. Define plasticity index and flow index.
23. Define plasticity
24. What is a zero air voids line? Draw a compaction curve and show the zero voids line.
25. Explain the term optimum moisture content of soil.
26. Define sensitivity and Thixotropy for a soil.
27. Define quick clay.
28. Define activity of clays and specific surface.
29. Define collapsible soils.
30. Define water content.
31. Distinguish between residual soil and transported soil.
32. Define effective size of a particle in sieve analysis

Part-B (16 Marks)

1. Explain IS soil classification system for classifying coarse-grained soil. (16)
2. Discuss various factors influencing compaction behavior of soils. (16)
3. Explain the IS the soil classification system for classifying fine-grained soil. (16)
4. Discuss the engineering behavior of compacted cohesive soils. (16)
5. Discuss in detail the engineering significance of the consistency limits of soil. (16)
6. Discuss the effect of compaction on various engineering properties of soils. (16)
7. Derive the relationship between porosity (n) and void ratio (e). (16)
8. Describe the proctor compaction test in detail. (16)
9. Draw the diagram for the three Waterberg limits of a soil and mark the various soil phases. (16)
10. Discuss various methods available for field compaction. (16)
11. Explain the textural classification system with a neat sketch. (16)
12. Draw neatly the IS plasticity chart and label the symbol of various soils. (16)
13. Draw typical moisture content-dry density relationship for a soil obtained from standard proctor compaction test and label the salient points. (16)
14. Describe the procedure for determining water content and specific gravity of a given soil in the laboratory by using a pycnometer. (16)
15. Discuss about the grain size distribution of soil by (16)

- (i) Sieve analysis (ii) Sedimentation analysis
16. Explain in detail about formation and types of soil. (16)
 17. Discuss about the various composition of soil. (16)
 18. Discuss about US soil classification system. (16)
 19. Explain about clay mineralogy and list out various mineral. (16)
 20. Discuss about various structural arrangement of soil grains. (16)

Unit-II : Soil Water and Permeability

Part-A (2 Marks)

1. What is meant by total stress, neutral stress and effective stress?
2. What is meant by capillary rise in soil and how it affects the stress level in soils?
3. What are the different types of soil water?
4. List out the methods of drawing flow net.
5. What is quicksand condition? Under what circumstances can it occur?
6. Write typical range of coefficient of permeability for gravel, sand, silt and clay.
7. What is the importance of effective stress?
8. State the assumptions in construction of flow net.
9. State Darcy's law.
10. What is capillary stress?
11. Write the various types of field permeability tests.
12. Define flow net. Draw a neat sketch.
13. How do you know that the flow through a soil obeys Darcy's law?
14. Derive the expression for capillary rise in a tube inserted in water.
15. List the various uses of flow net in engineering practice.
16. What is the difference between discharge velocity and seepage velocity?
17. Compare seepage velocity with superficial velocity.
18. Define capillary water.
19. Define critical hydraulic gradient.
20. What are the factors that affect hydraulic conductivity?

Part-B (16 Marks)

1. Write down the procedure for determination of permeability by constant head test in the laboratory. (16)
2. What is flownet? List the properties of flownet. (16)
3. Define flownet. Discuss about its uses. (16)
4. Explain about various factors affecting co-efficient of permeability of soil. (16)
5. Briefly explain about the laboratory methods of permeability test with neat sketch. (16)
6. What is a flownet? Describe the method used to construct the flownet. (16)
7. What is soil suction? How is it measured? What are the factors that affect soil suction? (16)
8. Critically discuss different methods of determining flownets. (16)
9. With the help of neat sketches and usual notations, derive expressions for the following; (16)
 - (i) Co-efficient of permeability by constant head method
 - (ii) Co-efficient of permeability by variable head method
 - (iii) Average co-efficient of permeability of layered soil system, when flow takes place perpendicular to the bedding plane.State the assumptions made in each of them.
10. Define; (16)
 - (i) Total stress
 - (ii) Neutral stress and
 - (iii) Effective stress.Write also about their significance.
11. List the various types of soil water. (16)
12. Describe the unconfined pumping out flow and determine the co-efficient of permeability of soil. Also explain draw curve. (16)
13. Define; (16)
 - (i) Quick sand condition
 - (ii) Critical hydraulic gradient
14. Name the various methods of laboratory determination of permeability with the soil type in which they are best suited and explain anyone method in detail. (16)

Unit-III : Effective Stress Distribution due to Applied Loads and Settlement

Part-A (2 Marks)

1. What is the basis of the construction of Newmarks influence chart? or What is the principle behind Newmark's influence chart?
2. What are the factors that influence the compression behaviour of soils?
3. Define co-efficient of compressibility.
4. What is an influence diagram? What is its use in practice

5. List the assumptions made in Boussinesq's analysis of stress distribution.
6. Define over consolidation, normally consolidated and under consolidated soil.
7. What is consolidation?
8. Define process of consolidation.
9. Give the applications of pressure bulb.
10. Define secondary consolidation.
11. State the Boussinesq formula for vertical stress distribution in soil under a point load.
12. What are the components of settlement?
13. State the assumptions made in Terzaghi's one dimensional consolidation theory.
14. What is the use of consolidation test data
15. Define coefficient of consolidation and compression index.
16. Compare Boussinesq's and westergaard's analysis of stress distribution.
17. Define stress Isobar or pressure bulb.
18. What are the stages of consolidation?
19. Define Isobars.

Part-B (16 Marks)

1. Explain in details of the determination of co-efficient of consolidation using log it method. (16)
2. Discuss Terzaghi's theory of consolidation, starting the various assumptions and their validity. (16)
3. Explain with neat sketch Taylor's method for determination of co-efficient of consolidation. (16)
4. Discuss the factors influencing settlement characteristics of soils. (16)
5. Describe the detail procedure of determination of vertical effective stress by using Newmarks chart method with neat sketches and equations. (16)
6. Describe the Newmark's chart and its applications. (16)
7. Describe Terzaghi's theory of one-Dimensional consolidation along with the spring analogy. (16)
8. Explain the procedure to use Newmark's influence chart. (16)
9. Derive the equation for Terzaghi's theory of one-dimensional consolidation with a neat sketch. (16)
10. Discuss in detail about the Boussinesq's analysis to find vertical stress and horizontal shear stress for point load. (16)
11. List the Boussinesq's theory, Assumptions and limitations. (16)
12. List the different components of settlement? Explain their occurrence with respect to the (16)

change in soil systems.

13. Write a brief critical note on “the concept of pressure bulb and its use in soil engineering practice”. (16)

Unit-IV : Shear Strength

Part-A (2 Marks)

1. Write down the mohr's coulomb failure envelop equation.
2. Why triaxial shear test is considered better than direct shear test?
3. State the principle of direct shear test.
4. What is the effect of pore pressure on shear strength of soil?
5. What is meant by deviator stress?
6. What are shear strength parameters?
7. Define stress path.
8. Enumerate the limitations of box shear test.
9. Give the coulumb's shear strength equation and list the shear strength parameters.
10. Define liquefaction and the effects on structural stability due to liquefaction.
11. Draw the mohr's circle diagram for UCC test and mention the salient features.
12. Give one example each of the use of CU strength and CD strength results in engineering practice.
13. Draw the strength envelops for fully saturated clay subjected to CD test and fully saturated sand subjected to UU test.
14. Draw typical stress-strain curve for specimens failed by brittle failure and plastic failure.
15. What do you meant by Thixotropy?
16. Write the advantages of direct shear test.
17. List different types of shear tests based on drainage.
18. List out the demerits of triaxial test.
19. Write whether the following statement is true or false. On the failure plane, the shear stress is maximum.
20. List the merits and demerits of triaxial test.
21. What is meant by sensitivity?
22. What is meant by degree of sensitivity?

Part-B (16 Marks)

1. Write down a step by step procedure for determining of cohesion of a given clayey soil by conducting unconfined compression test. (16)
2. What are the advantages and disadvantages of triaxial compression test. (16)
3. Explain with neat sketches the procedure of conducting direct shear test. Give it's advantages over other method of finding shear strength of soil. (16)
4. What is the Mohr's strength theory of soil? Derive the expression relating major and minor principal stresses and shear strength parameters of soil. (16)
5. Explain in detail with neat sketches about triaxial shear test conducted in laboratory along with it's merits and demerits. (16)
6. Sketch the stress-strain and volume change relationships for dense and loose sand. (16)
7. Explain discuss about the various types of triaxial shear test based in drainage condition. (16)
8. Explain vane shear test. (16)
9. Explain direct shear test stating clearly it's advantages and disadvantages. (16)
10. Draw the Mohr-Collomb failure envelopes of CU, CD and UU tests sandy soil and comment on the shear strength parameter. (16)
11. How do you find the shear strength of soil using vane shear test? And derive the formula used to calculated shear strength. Where this test is mostly used. (16)
12. Describe the vane shear test in detail and explain the two methods adopted in this test- fully submerged vane and partially submerged vane. (16)
13. Define deviator stress and its significance in Triaxial shear strength test. (16)
14. Explain the triaxial shear tests based on drainage and their applicability. (16)
15. Write the advantages, disadvantages and limitations of direct shear test. (16)

Unit-V : Slope Stability

Part-A (2 Marks)

1. What are the different types of slopes?
2. Define stability number.
3. Define stability factor
4. Define finite slope
5. Write the formula for finding factor of safety with respect to cohesion and friction.
6. Differentiate the modes of failure of finite and infinite slopes.
7. What is the effect of depth of failure surface on the stability of infinite slope in cohesion less

soil?

8. What is tension crack?
9. Differentiate finite and infinite slope.
10. Mention the methods of protecting slopes of soils.
11. State the influence of tension crack in factor of safety in the cracks are filled with water and without water.
12. How Taylor's stability number is utilized for slope stability analysis?
13. Mention different modes of slope failure with figure.
14. What are the factors leading to the failure of slopes? (May/June 2016)
15. What are the three forces acting in circular failure while analyses through friction circle method?
16. Draw a slip circle for a failure plane in a slope and show the forces involved.
17. List out the different factors controlling selection of appropriate method of slope protection measures.
18. What are different factor of safety used in the stability of slop.
19. What is a land slide
20. What do you know about infinite slopes?
21. What do you mean by slide?
22. Why does a slope be analyzed?
23. Write down the assumptions made in the analysis of slope?
24. What are the causes of slope failure?

Part-B (16 Marks)

1. Describe modified Bishop's method for the stability analysis of slope. What are it limitations? (16)
2. Discuss various methods to protect the slopes with neat sketches. (16)
3. Discuss friction circle method for stability analysis of slope. (16)
4. Describe the Fellinius circle method of analyzing the stability of slopes. (16)
5. Brief total stress method of analysis of stability of slopes. (16)
6. Differentiate between finite and infinite slopes. (16)
7. Write explanatory note on: (16)
 - (i) Taylor's stability number,
 - (ii) Stability of infinite slope,
 - (iii) Stability of slopes of an earthen dam.

8. Discuss in detail about different modes of finite slope failure and different methods of analyzing factor of safety of finite slopes. (16)
9. Discuss the stability analysis of slopes by method of slices for Cohesionless soil. (16)
10. Explain the method of slices for stability analysis of slopes. (16)
11. Explain the following with sketch: (16)
 - (i) Total stress analysis.
 - (ii) Effective stress analysis.
12. Describe in detail the Swedish Slip Circle method. (16)
13. State the use of Taylor's chart and its applicability. (16)

Course Faculty

HoD