

# Experimental Soil Mechanics

## Question Bank

### Question

#### No.

- Q1** Will the oven temperature change if Organic soil was tested instead of inorganic Soil? If yes, why?
- Q2** If you test a high plasticity soil, what is the expected water content?
- Q3** Explain that the water content increase or decrease with depth? Why?
- Q4** Which method is mostly used to determine the water content in field?
- Q5** What are the factors that effect on value of  $G_s$ ?
- Q6** Why do we use vacuum while determining the specific gravity of soils?
- Q7** What are typical values of the specific gravity of soils?
- Q8** What is the effect of water temperature on the determination of specific gravity of soils?
- Q9** If you did not adequately de-air your specific gravity specimen such that bubbles remained, would you overestimate or underestimate specific gravity? Why?
- Q10** On what range of particle size does the sieve analysis apply?
- Q11** Under what conditions should you use wet sieving instead of dry sieving?
- Q12** On which basis do you select the number and opening of sieves for the sieve analysis of a given soil?
- Q13** Does hydrometer analysis determines the size of soil particles exactly?
- Q14** Why must you slowly insert and remove the hydrometer in the sedimentation cylinder?
- Q15** Is it possible to carry out a sieve analysis on a sample of clay? Why?
- Q16** What are the applications of grain size analysis in engineering practice?
- Q17** What physical quantity is read on the stem of a 152 H hydrometer? At what location does it measure it?
- Q18** For what reason do you agitate the suspension at the beginning of the hydrometer test?
- Q19** Why it can not be used more than 60 g of soil per 1000ml of water in the hydrometer test?
- Q20** Why we use Atterberg limits to characterize fine-grained soil? Why the result of the hydrometer analysis is insufficient for this purpose?
- Q21** Why it is not preferable to leave the soil in the brass cup for along period of time?
- Q22** The liquid limit cannot be more than 100%. It is true or not? Explain.
- Q23** The plasticity index of highly plastic soil is about what?
- Q24** How you can describe the soil, when either LL or PL can not be determined?
- Q25** Several factors (operation factors) that affect the liquid limit test or the number of blows required to close the standard groove 12.7mm.

- Q26** Mention factors that affect the liquid limit test.
- Q27** The soil specimen should be fully saturated before taking observation. Is it true or not? Explain.
- Q28** Why it is not preferable to leave the soil in the brass cup for along period of time?
- Q29** Distilled water is preferable to tap water for determining liquid limit?
- Q30** Define the plasticity index.
- Q31** What is the effect of Plastic Limit on the properties of soils? Explain
- Q32** Permeability tests on soils of low permeability must be performed very carefully for the results to have meaning? Why?
- Q33** Mention the merits of using deaired water in the permeability test?
- Q34** Neither the constant-head nor the falling-head laboratory provides a reliable value for the coefficient of permeability of a soil?
- Q35** Does the permeability coefficient increases or decreases with water temperature? Why?
- Q36** A permeability of  $10^{-4}$  cm/sec may be considered borderline between pervious and impervious soils. Give example for  $k$  (less and more) than  $10^{-4}$  cm/sec that might be considered for engineering projects.
- Q37** Under which condition,  $Q_{in}$  is not equal to  $Q_{out}$ ?
- Q38** According to relative consistency (very soft, soft, firm (stiff), hard and very hard), what is your soil consistency?
- Q39** Explain why unconfined compression test is not applicable for granular soils.
- Q40** Why is the shear strength achieved from this test called the “undrained shear strength”?
- Q41** The unconfined compression test does not generally provide a very reliable value of soil shear strength? Why?
- Q42** Which case in field does UU test simulate?
- Q43** Under which state, test conditions and types of shear parameters should be chosen?
- Q44** It is conventional in soil mechanics to correct the on which the load  $p$  is acting? Why?
- Q45** The specimen should reach failure within about 10 min.?
- Q46** Explain effect of increasing load  $P$  during test on the modulus of elasticity ( $E$ ) by computing of  $0.25 q_u$ ,  $0.5q_u$ ,  $0.75q_u$ , and for  $q_u$ ?
- Q47** The shear strength of plastic undrained clay depends upon internal friction or cohesion?
- Q48** What is the major point that the direct shear test differs from the other two shear test?
- Q49** What is the major point that the direct shear test differs from the other two shear test?
- Q50** What is the disadvantages of the direct shear test?
- Q51** It is conservative or un-conservative to correct the area in direct shear test? Why?
- Q52** Under which criteria, the space between the two parts of shear box will be selected?

- Q53** Write appropriate comments about the shape of the curve which is plotted between horizontal displacement and vertical movement.
- Q54** Settlements in a cohesive soils take place in a short time ? This statement is true or not? Explain.
- Q55** The rate of drainage in consolidation test depends upon
- Q56** The consolidation test proceeds by applying loads in geometric progression with a load ratio  $\Delta P/P = 1$ ? Why?
- Q57** When the greatest amount of the total compression of the sample occurs as soon as at the start or end of the loading?
- Q58** The soil is normally consolidated clay or over consolidated clay if overburden pressure is 50 KPa?
- Q59** The hydrometer is usually a type ----- and is calibrated to read ----- of soil that still in suspension of a value of  $G_s=2.65$  in-----.
- Q60** The effect of water impurities and the dispersing agent on hydrometer readings can be obtained by using a ----- from the same source and with the same quantity of dispersing agent -----.
- 1.The coefficient of permeability of a soil:
- a. increase with an increase in temperature. b.
- Q61** increase with a decrease in temperature.
- c. increase with a decrease in unit weight of water.
- d. decrease with an increase in void ratio.
- 2.Brittle failure in which the specimen:
- a-bulges laterally without splitting. b.
- Q62** shears along one or more defined surface.
- c. intermediate between (a) and (b).
- d. failure into a barrel shape.
- Adjust the gap between the parts of the direct shear box in direct shear test by
- Q63** turning the -----setscrews.
- a.clamping. b. lifting c. mounting d. studding.
1. The most accurate method for determination of water content in the laboratory is ----- method
- Q64** a)sand bath b) oven-drying c) pycnometer
- d) calcium carbide
2. Stokes' Law does not hold good if the size of particles is
- Q65** a) less than 0.2 mm b) less than 0.2  $\mu$ m c) neither (a) nor (b)
- d) both (a) and (b)
- The maximum size of particles of clay is
- Q66** a) 0.2 mm b) 0.02 mm c) 0.002mm d)
- 0.0002 mm
- In the field, the coefficient of permeability of a soil can be determined by
- Q67** a) oedometer consolidation cell b) pumping test from wells
- c) indirect method d) direct method

- The shear strength of plastic undrained clay depend upon
- Q68** a) internal friction                      b) cohesion                                      c)  
both (a) and                      d) neither (a) nor (b)

**Mention whether the following statements are true or false, then correct the false one.**

- Q69** 1.Undisturbed sample is taken by sampler consist of a section of (Split Spoon).
- Q70** 2.The specific gravity of particles of coarse-grained is seldom greater than (2.7).
- Q71** 3.The sedimentation analysis is useful for all soil particles smaller than (75  $\mu\text{m}$ ) size.
- Q72** 4.For a given soil, the coefficient of permeability increases with increase in void ratio.
- Q73** 5.The dense sand increases in volume during shear.
- Q74** 6.The friction in the fixed ring cell is less than that in the floating-ring cell.
- Q75** What is the reason for having a gap between the two halves of the shear box?
- Q76** What are the criteria for stopping a test in the triaxial and unconfined compression tests?
- Q77** Why the result of the hydrometer analysis is insufficient to characterize fine-grained soil?
- Q78** In a direct shear test, specimen cutters are used for the preparation of which types of soil samples.
- Q79** How many types of failure could be possible for the soil sample during the triaxial and unconfined compression test?
- Q80** An unconfined compression test was carried out on a silty clay sample with a diameter and length of 38 mm and 84 mm, respectively. The maximum load that the sample carried was 35 kg at a vertical displacement of 8 mm. Determine the undrained shear strength ( $C_u$  in  $\text{kN/m}^2$ ) of the soil?