



GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **CE352U - Geotechnical Engineering**

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Maximum Marks : **60**

Duration : **3 Hrs**

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Answer Key Submission Type: No marking scheme and solution

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

- 1) a) Solve any Two [8]
- i. Draw typical particle size distribution curve for
 - i. A well graded soil
 - ii. A poorly graded soil
 - iii. A gap graded soil
 Which of the above three types of soil would consider as the best foundation material? Give reason in support of your answer
 - ii. Distinguish bulk density and dry density of a soil. Derive a relationship between them
 - iii. State Stokes law. Discuss its limitations with reference to its application in the hydrometer test
- b) The volume and mass of a saturated clay sample are 22.5cc and 35.84 g respectively. On drying in an oven, its mass reduced to 21.42 g. The volume of the dry soil pat was found to be 11.78cc. Determine the shrinkage limit, specific gravity and shrinkage ratio of the soil. [5]
- 2) a) Solve any Two [8]
- i. What is quick sand? Under what circumstances can it occur?
 - ii. What is compaction curve? Give its salient features. What is zero air void line
 - iii. Explain in details the major factors affecting the permeability of soil
- b) A falling head permeability tes is carried out on a 15cm long sample of silty clay. The diameter of the sample and the stand pipe are 9.8 cm and 0.75 cm respectively. The water level in the stand pipe falls from 60cm to 45 cm in 12 min. Determine
- i. the coefficient of permeability of the soil in m/day
 - ii. height of water level in the stand pipe after another 20 min
- [5]
- 3) a) Solve any Two [8]
- i. What is compaction curve? Give its salient features. What is zero air void line
 - ii. What is Newmark's chart? How is it helpful in computing the vertical stress at any depth due to loaded area
 - iii. What is Isobar? Explain in brief the procedure for drawing isobars.
- b) A vertical concentrated force of 40 KN is acting at a point on the ground surface. Determine the vertical stress intensities due to this load at the following points
- i. At a depth of 2.5 m below GL on the line of action of the load
 - ii. At a depth of 1.5 m below GL and radial distance of 3m
- [5]
- 4) a) Solve any two [8]
- i. Explain square root of time fitting method of determination of coefficient of consolidation
 - ii. Explain the primary consolidation by spring analogy system
 - iii. Explain pre-compression in clay and how will you determine the pre-consolidation pressure?
- b) A soil sample is subjected to a major principal stress of 25kPa and minor principal stress of 10 kPa in the vertical and horizontal directions respectively. Determine the normal and shear stresses on a plane inclined at 300 to the major principal stress. [5]
- 5) a) What is a failure envelope? Draw typical sketches of failure envelopes of a) dry sand b) saturated clay c) partially saturated clayey silt, as obtained from undrained shear tests [4]
- b) State the advantages and disadvantages of pre- compression for improvement of soft and compressible deposits [4]

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