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Total Number of Pages : 02

M.Tech.
GEPE209

2nd Semester Back Examination 2017-18
FUNDAMENTALS OF SOIL BEHAVIOUR
BRANCH : GEOTECHNICAL ENGG

Time : 3 Hours

Max Marks : 70

Q.CODE : C1058

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Assume suitable data wherever necessary

Answer all parts of a question at a place.

- Q1 Answer the following questions : (2 x 10)**
- a) Differentiate between true cohesion and apparent cohesion.
 - b) How are the minerals kaolinite and montmorillonite different from each other?
 - c) What do you mean by dilatancy of soil?
 - d) Why soils are classified? What is its Engineering importance?
 - e) Define pre-consolidation pressure. What is its significance?
 - f) What is the concept of diffused double layer in clay?
 - g) What is the role of effective pressure in soil mechanics?
 - h) Sketch the stress-strain relationship for medium dense and loose sand.
 - i) Why do some soils swell while others do not?
 - j) What causes frost heave, and how can it be prevented?
- Q2 How are soils formed? Bring out the typical characteristics of the following soils: (10)**
alluvial, glacial, aeolian and lacustrine.
- Q3 As the geotechnical engineer on a project, you find an inorganic soil containing (10)**
15 percent by weight of particles finer than 100 μm , as measured by hydrometer analysis. What soil components do you expect? Why? How could you confirm this expectation? Be specific in terms of tests and diagnostic criteria.
- Q4 An inorganic clay has a liquid limit of 350 percent. What is the most probable (10)**
predominant clay mineral in this soil? Explain the high liquid limit in terms of the crystal structure of this mineral. Would you recommend founding light structures on shallow footings above this soil? Why?
- Q5 a) The soil profile at a site that must be dewatered consists of three homogeneous (5)**
horizontal layers of equal thickness. The value of k for the upper and lower layers is 1×10^{-6} m/s and that of the middle layer is 1×10^{-4} m/s. What is the ratio of the average hydraulic conductivity in the horizontal direction to that in the vertical direction?
- b) Two slurries of the same clay, one with flocculated clay particles and the other (5)**
with deflocculated particles, have been consolidated under an effective stress of 100 kPa. Which will have the higher (a) void ratio, (b) sensitivity, (c) strength? Explain your answer.

- Q6** a) In a clay stratum below the water table, the pore pressure is 36 kN/m^2 at a depth of 3 m. Is the clay fully consolidated under the existing pressure? Explain. (5)
- b) Differentiate between shear strength parameters obtained from total and effective stress considerations. (5)
- Q7** a) Explain the Mohr-Coulomb strength envelope. What is the effect of pore pressure on strength of soils? (5)
- b) Discuss the causes and types of damages and cracks in buildings on expansive soils. (5)
- Q8** Write Short Notes on any Two : (5 x 2)
- a) A-line
 - b) Strength of partially saturated soils
 - c) Coefficient of consolidation
 - d) Pore pressure ratio