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Question Paper Code: 54015

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Civil Engineering

15UCE405 - SOIL MECHANICS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- _____ is defined as the property of a porous material which permits the passage or seepage of water through its interconnecting voids.
 - Permeability
 - Stremeability
 - both (a) and (b)
 - none of these
- If the pores of a soil are completely full of air only, the soil is said to be
 - Wet soil
 - Dry soil
 - fully saturated soil
 - partially saturated
- A flow net may be utilized for the determination of
 - exit gradient
 - seepage
 - hydrostatic pressure
 - all the above
- A flow net may be utilized for the determination of
 - exit gradient
 - seepage
 - hydrostatic pressure
 - all the above
- Compression of sand particles gives rise to _____ aquifer.
 - stressed
 - strained
 - confined
 - none of these

6. The ratio of settlement at any time 't' to the final settlement, is known as
 (a) coefficient of consolidation (b) degree of consolidation
 (c) consolidation of undisturbed soil (d) consolidation index
7. Triaxial compression test was first introduced in the year of
 (a) 1936-37 (b) 1946-47 (c) 1956-57 (d) 1932-33
8. Shear strength of a soil is a unique function of
 (a) effective stress only (b) total stress only
 (c) both effective and total stress (d) none of these
9. Bishop's method of stability analysis
 (a) is more conservative
 (b) neglects the effects of forces acting on the sides of the slices
 (c) assumes the slip surfaces as an arc of a circle
 (d) all the above
10. Failure of finite slopes occurs along a _____ surface.
 (a) curved (b) circled (c) square (d) rectangle

PART - B (5 x 2 = 10 Marks)

11. What is the relationship between unit weight and density?
12. Define the term Darcy's law.
13. Distinguish between compaction and consolidation.
14. Mention about essential points of Mohr's strength theory.
15. How do you define failure in soils?

PART - C (5 x 16 = 80 Marks)

16. (a) Write brief notes on classifications of rocks. (16)
- Or
- (b) Explain the Indian Standard method of classification for soil system. (16)
17. (a) Explain and discuss the merits and demerits of different methods of sketching flow nets. (16)

Or

(b) Explain in detail about factors affecting permeability. (16)

18. (a) Explain with a neat sketch the Terzaghi's one dimensional consolidation theory. (16)

Or

(b) Enumerate in detail about factors that affecting compaction. (16)

19. (a) A c-u triaxial compression test was performed on a saturated sand at a cell pressure of 100 kPa. The ultimate deviator stress was 350 kPa and the pore pressure at the peak stress was 40 kPa. Estimate the total and effective stress shear strength parameters. (16)

Or

(b) In a direct shear test conducted on a dense sand, the sample fails at a shear stress of 75 kN/m^2 , when the normal stress was held constant at 100 kN/m^2 . Draw the mohr circle for the failure condition and determine (i) the angle of shearing resistance (ii) the orientation of the major and minor principal planes and stresses acting on them and (iii) the orientation of the plane of maximum shear stress. If a specimen of the soil were to be tested in a tri-axial shear test under CD conditions at a cell pressure of 125 kN/m^2 , at what axial stress would the sample fail? (16)

20. (a) A new canal is excavated to a depth of 5 m below ground level, through a soil having the following characteristics: $c = 14 \text{ kN/m}^2$; $\phi = 15^\circ$; $e = 0.8$ and $G = 2.70$. The slope of banks is 1 in 1. Calculate the factor of safety with respect to cohesion when the canal runs full. If it is suddenly and completely emptied, what will be the factor of safety? (16)

Or

(b) How a slope is analyzed using friction circle method? Drive an expression for the factor of safety. (16)
