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Question Paper Code : 33225

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fourth Semester

Civil Engineering

CE 1251/CE 1252/070100029 – MECHANICS OF SOILS

(Regulation 2004/2007)

(Common to B.E. (Part – Time) Third Semester, Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define 'Consistency limits'. Why is it important?
2. What is the purpose of doing sedimentation analysis of soil?
3. What are the various forms of soil water?
4. What are the points to be remembered when flow nets are drawn?
5. Differentiate immediate and consolidation settlement.
6. What is pre-consolidation pressure?
7. What are the various laboratory methods of determining shear strength?
8. Define 'stress path'.
9. What is 'friction circle'?
10. What are the problems encountered when slope protection measures are not done?

PART B — (5 × 16 = 80 marks)

11. (a) Explain how insitu tests are carried out to determine density of soil.

Or

- (b) Sampling was done to collect undisturbed samples in the field. Wet sample weighing 1050 gm was collected occupying a volume of 500 cm³. The weight of the sample reduced to 992 gm upon drying. If $G = 2.66$, calculate

- (i) Bulk unit weight (γ_b)
- (ii) Dry unit weight (γ_d)
- (iii) Water content (w)
- (iv) Degree of saturation (S)
- (v) Void ratio (e) and
- (vi) Porosity (n).

12. (a) Plot the total, neutral and effective stress distribution diagram of a soil profile at depths 2m, 4m and 10m. The soil profile shows that top soil of 2m is dry sand with $e = 0.60$ and $G = 2.65$. From 2m to 4m, the sand is saturated with capillary water. Below 4m depth, the sand is fully under submerged condition up to 10m. Assume that water table is at 4m below ground level.

Or

- (b) Describe any two methods of construction of flow nets.

13. (a) Derive Boussinesq's formula to calculate vertical stress distribution in soils.

Or

- (b) A one dimensional consolidation test was conducted on a 20mm thick sample of clay and found that 50% of consolidation is over in 15 minutes under double drainage condition. The same sample of clay in the field of about 2m depth is underlined by an impervious rock. Calculate the coefficient of consolidation and determine the time required for 50% and 90% consolidation of field clay.

14. (a) Explain laboratory vane shear test with a neat diagram. Mention its advantages and disadvantages.

Or

- (b) Two identical samples were tested in a triaxial setup. The cell pressure for the first sample was 150 kN/m^2 and the sample failed at an additional vertical stress of 600 kN/m^2 . The second sample failed at 1200 kN/m^2 when the cell pressure is 300 kN/m^2 . Calculate the shear strength parameters by constructing Mohr's circle.

15. (a) Explain Swedish circle method of analysis of slope.

Or

- (b) An embankment made of $C - \phi$ soil is inclined at an angle of 35° and its height is 15m . The angle of shearing resistance is 15° , cohesion is 250 kN/m^2 and unit weight of soil is 20 kN/m^3 . If $S_n = 0.06$, calculate the factor of safety with respect to cohesion.