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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -1 EXAMINATION- FEBRUARY 2019

B.Tech. IV Semester

COURSE CODE: 10B11CE411

MAX. MARKS: 15

COURSE NAME: GEOTECHNICAL ENGINEERING

COURSE CREDITS: 04

MAX. TIME: 1 HR

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume necessary data as per IS code.*

1. Derive the expression for Relative Density ( $R_D$ ) in terms of Dry Unit Weight ( $\gamma_d$ ). [3 Marks]
2. Justify the statements with reasons:
  - a) 'Clays containing montmorillonite show high volume expansion and shrinkage.'
  - b) 'Clay - water interaction results in a flocculated structure.'[1+2 = 3 marks]
3. During a sedimentation test for grain-size distribution analysis, the corrected hydrometer reading for a 1000cc uniformly mixed soil suspension at the instant of starting sedimentation ( $t = 0$ ) was 1.030. After 30 minutes, the corrected hydrometer reading at an effective depth of 10 cm was noted to be 1.015. If  $G = 2.65$  and  $\eta = 0.01$  dyne - sec/cm<sup>2</sup>, find
  - a) The total wt. of soil solids placed in the 1000 cc suspension.
  - b) The diameter and %age finer ( $N\%$ ) corresponding to 30 min. reading.[2+2=4 marks]
4. Earth is required to be excavated from borrow pits for building an embankment. The wet unit weight of undisturbed soil is  $18 \text{ kN/m}^3$  and its water content is 8%. In order to build a 4 m high embankment with top width 2 m and side slopes 1: 1, estimate the quantity of earth required to be excavated per meter length of embankment.  
The dry unit weight required in the embankment is  $15 \text{ kN/m}^3$  with a moisture content of 10%. Assume the specific gravity of solids as 2.67. Also determine the void ratios and degree of saturation of soil in both the undisturbed and remoulded states.  
[2+1+2 = 5 marks]