JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 3 EXAMINATION - May 2019

B. Tech. IV Semester

COURSE CODE: 10B11CE411   MAX. MARKS: 35

COURSE NAME: GEOTECHNICAL ENGINEERING

COURSE CREDITS: 04   MAX. TIME: 2Hrs

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

[1] A standard specimen of cohesionless sand was tested in triaxial compression and the sample failed at a deviator stress of 482 kN/m^2, when the cell pressure was 100 kN/m^2, under drained condition.
   a) Find the effective angle of shearing resistance of sand.
   b) What would be the deviator stress and the major principal stress at failure for another identical specimen of sand if it is tested under a cell pressure of 200 kN/m^2?   [2+3 = 5]

[2] Derive the expression for Mohr – Coulomb failure criterion.   [5]

[3] What is phreatic line? Describe the principle and procedure to draw the first flow line for an unconfined flow. Derive the expression for discharge through the body of an earthen dam with filter clearly bringing out the significance of locating the phreatic line.   [5]

[4] A layer of clay 2 m thick is subjected to a loading of 0.5 kg/cm^2. One year after loading, the average consolidation is 50%. The layer has double drainage,
   (i) What is the coefficient of consolidation?
   (ii) If the coefficient of permeability is 3 mm/year, what is the settlement after one year?
   (iii) How much time will the layer take to reach 90% consolidation?   [2+2+2 = 6]

[5] Derive Terzaghi's one – dimensional consolidation, stating all the assumptions and their significance. Also describe the solution for Terzaghi's consolidation equation and its significance in consolidation determination.   [6]

[6] Differentiate between compaction and consolidation. Also explain how permeability changes with compaction?   [3]

[7] In a consolidation test, the void ratio of the specimen which was 1.068 under the effective pressure of 214 kN/m^2, changed to 0.994 when the pressure was increased to 429 kN/m^2. Calculate:

(i) Coefficient of compressibility
(ii) Compression index
(iii)Coefficient of volume compressibility.
(iv)Find the settlement of foundation resting on above type of clay, if thickness of layer is 8m and the increase in pressure is $10 \ kN/m^2$. $[1+1+1+2 = 5]$