JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MID TERM (SUMMER SEMESTER EXAMINATION)- JUNE-2018

B.Tech VI Semester

COURSE CODE:10B11CE411   MAX. MARKS:50

COURSE NAME: Geotechnical Engineering

COURSE CREDITS: 04   MAX. TIME: 2 Hrs

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

1. Derive the following relations/expressions:
   a) Relation between void ratio, degree of saturation, water content and specific gravity.
   b) Expression for coefficient of permeability parallel to the bedding plane.   **[5x2]**

2. An airport runway fill needs 6 lakh m^3 of soil compacted to a void ratio of 0.75.The soil can be imported from two borrow pits A and B having void ratio of 0.8 and 1.7 respectively. The transportation costs of soil from both the pits are Rs.10 and Rs.5 per cu.m. respectively. Which of the two borrow pits will be more economical.   **[5]**

3. 1 cu.m. of wet soil weighs 20kN while its dry weight is 18kN.Specific gravity of solids is 2.67.Determine the water content, porosity, void ratio and degree of saturation of the soil. **[8]**

4. Explain the phenomenon of quick sand. A masonry dam has pervious sand as foundation. Determine the maximum permissible upward gradient if a factor of safety of 4 is required against quick sand condition. The sand has porosity of 45% and specific gravity of 2.65.   **[2+5]**

5. A flow net for seepage under sheet pile showed 12 potential drops and average 4.5 number of flow lines. The permeability of sand is 5×10^{-3}cm/sec. If the saturated unit weight of sand is 19kN/m^3 and total head loss across the piping is 2 m, determine the quantity of seepage in cum/day/m length of the piping.   **[5]**

6. A clay soil tested in consolidometer showed a decrease in void ratio from1.2 to 1.1 when pressure increased from 0.25 to 0.5 kgf/cm^2. The coefficient of consolidation is 10m^2/year. Determine coefficient of compressibility, coefficient of volume compressibility and coefficient of permeability. If the sample belongs to a clay layer 3m in thickness, determine its consolidation settlement as per the given stress increment.   **[10]**

7. A concentrated load of 200 kN is applied on the ground surface. Determine the vertical stress at a point P which is 6 m directly below the load and at a point Q which is 5 m horizontally situated from point P.   **[5]**