

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION - 2016

B.Tech. IV Semester

COURSE CODE: 10B11CE411

MAX. MARKS: 25

COURSE NAME: GEOTECHNICAL ENGINEERING

COURSE CREDITS: 04

MAX. TIME: 1 Hr 30 Min

*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. At a site the subsoil consists of a 8m thick clay layer of dry sand ( $G = 2.65$ ;  $e = 0.85$ ;  $D_{10} = 0.14\text{mm}$ ) which is underlain by a 6m thick clay layer ( $G = 2.75$ ;  $w = 22\%$ ) below which there exists a thick layer of rock. The sand layer is found to support capillarity. The water table is located at a depth of 6m below the ground level.
  - a) Calculate total, neutral and effective stress.
  - b) Plot the distribution of total, neutral and effective stress. [3 + 2 = 5]
  
2. A laboratory constant head permeability test was conducted on a silty sand specimen of void ratio 0.45. The cylindrical specimen had a diameter of 7.3 cm and a height of 16.8 cm. The head during the test was 75 cm. After 1 minute of testing at room temperature of  $20^\circ\text{C}$ , a total 775.6 gm of water was collected.
  - a) Compute the coefficient of permeability in m/s.
  - b) If the void ratio changes to 0.38, what would be the change in permeability? [2 + 3 = 5]
  
3. The consistency limits of a soil sample are:  $LL = 52\%$ ;  $PL = 35\%$ ;  $SL = 17\%$ . If the specimen of this soil shrinks from a volume 10 cc at liquid limit to 6.1 cc at plastic limit, determine the specific gravity of solids. [5]
  
4. Explain the formation of diffuse double layer. Also describe how the diffuse double layer affects the soil structure. [5]

5. The particle size distribution of two soils is given in the figure below. The liquid and plastic limits of soil passing 425  $\mu\text{m}$  sieve are as follows:

| Limits        | Soil A | Soil B |
|---------------|--------|--------|
| Liquid limit  | 30     | 26     |
| Plastic Limit | 22     | 20     |

Classify the soil as per IS soil classification system. [5]

Given: No. 200 sieve = 75  $\mu\text{m}$  sieve.

No. 4 sieve = 4.75  $\mu\text{m}$  sieve.

