JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2023

COURSE CODE(CREDITS): 18B11CE411 MAX. MARKS: 25

COURSE NAME: Geotechnical Engineering

COURSE INSTRUCTORS: Ashok Kumar Gupta MAX. TIME: 1 Hour 30 Minutes

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

1. A 10 m thick bed of sand is underlain by a layer of clay of 6 m thickness. The water table which was originally at the ground surface is lowered by drainage to a depth of 4 m, whereupon the degree of saturation above the lowered water table reduces to 20%. Determine the increase in the magnitude of the vertical effective pressure at the middle of the clay layer due to lowering of water table. The saturated unit weights of sand and clay are respectively 20.6 kN/m^3 and 17.6 kN/m^3, and the dry unit weight of sand is 16.7 kN/m^3. (5)

2. A coarse-grained soil has a voids ratio of 0.78 and specific gravity as 2.67. Calculate the critical hydraulic gradient at which quick sand condition will occur. (2)

3. What will be the ratio of average permeability in horizontal direction to that in the vertical direction for a soil deposit consisting of three horizontal layers, if the thickness and permeability of the second layer are twice of those of the first and those of the third layer twice those of second? (5)

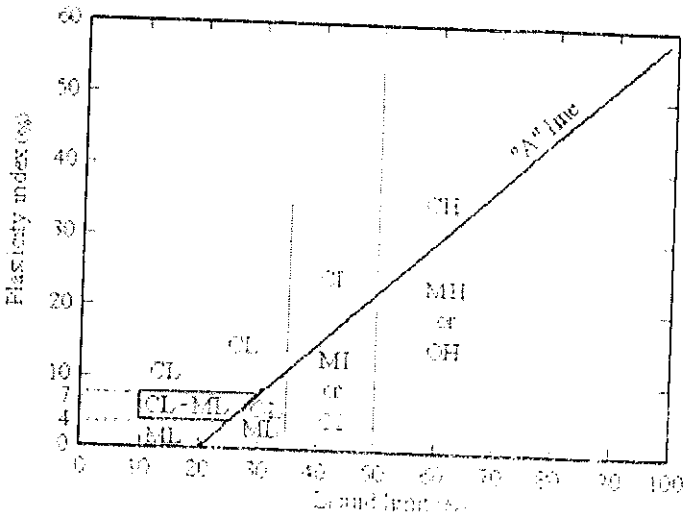
4. In a falling head permeameter test on a silty clay sample, the following results were obtained: sample length 12 mm; sample diameter 80 mm; initial head 1200 mm, final head 400 mm; time for fall in head 6 minutes; stand pipe diameter 4 mm. Find the co-efficient of permeability of the soil in mm/sec. (4)

5. A soil sample was tested for the consistency limits in the laboratory. The following data were obtained. Find the liquid limit of the tested sample. Classify the soil.

No. of Blows N	W%
8	43
20	39
30	37
45	35
Plastic limit is 25%	

(5)

6 Derive the relation for equivalent vertical permeability of layered soils. (4)


Plasticity index (%)
60
50
40
30
20
10
7
4
0
"A" line
CH
OH
CL
CL-ML
ML
MH
0
10
20
30
40
50
60
70
80
90
100