

D. Sawabh

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 2 EXAMINATIONS - 2022

B.Tech. - IV Semester (Civil)

COURSE CODE: 18B11CE411

MAX. MARKS: 25

COURSE NAME: Geotechnical Engineering

COURSE CREDITS: 03

MAX. TIME: 1 Hour 30 Min

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

[1] Using phase diagrams, derive the expression for shrinkage limit ' w_s ' when specific gravity of soil solids ' G_s ' is known. [5]

[2] With reference to both the consistency limits and indices, write a short note on their significance related to behavior of soils. [3]

[3] The values of LL, PL and SL of a soil were reported as: $w_L = 60\%$; $w_p = 30\%$; $w_s = 20\%$. If a sample of this soil at liquid limit has a volume of 40 cc and its volume measure at shrinkage limit was 23.5 cc, determine:

a) Specific gravity of the solids

b) Shrinkage ratio

[3+3 = 6]

[4] During a sedimentation test for grain size analysis, the corrected hydrometer reading in a 1000 cc uniformly mixed soil suspension at the instant of starting sedimentation ($t = 0$) was 1.030. After 30 mins, the corrected hydrometer reading at an effective depth of 10 cm was noted to be 1.015. If $G_s = 2.65$ and viscosity is $0.01 \text{ dyne} - \text{sec}/\text{cm}^2$, then find:

a) Total mass of the soil solids placed in 1000 cc of suspension

b) Diameter and percentage finer than corresponding to 30 min. reading. [3+3 = 6]

[5] In a shallow pond used by cattle for bathing, some cattle were lost each year whenever the pond bottom was unable to support the weight of an animal. As a consulting Geotechnical Engineer, you investigated that the pond was 1 m deep. Below it was a 5m thick layer of silty fine sand having a total unit weight of $18 \text{ kN}/\text{m}^3$. This was underlain by a layer of medium sand. The medium sand layer had pore water pressure which was observed to vary with the season as follows:

January to March	$75 \text{ kN}/\text{m}^2$
April to June	$60 \text{ kN}/\text{m}^2$
July to September	$100 \text{ kN}/\text{m}^2$
October to December	$80 \text{ kN}/\text{m}^2$

During which period is it unsafe for animals to bathe in the pond? Why?

[5]