

**Problem #1**

The pressure versus dial reading data determined from a consolidation test on an undisturbed saturated clay specimen are as follows:

Pressure (kPa)	Dial Reading (mm)
0	4.485
17	4.448
34	4.336
68	4.087
136	3.664
272	3.154
136	3.241
68	3.339
136	3.302
272	3.103
544	2.593
1088	2.033
272	2.319
68	2.692
17	3.152

Initially, the specimen height was 19 mm and its volume was  $92.4 \text{ cm}^3$ . The dry mass of the specimen was 162.3 g and its specific gravity  $G_s = 2.69$ .

(a) Plot the void ratio versus the logarithm of pressure curve and determine: the compression index, the modified compression index, and the swelling index.

(b) Compute the preconsolidation pressure using Casagrande procedure?

### **Problem # 2**

The following compression readings were obtained in an oedometer test on a specimen of saturated clay:

Pressure ( $\text{kN/m}^2$ )	0	54	107	214	429	858	1716	3432	0
Dial gauge (mm)	5.0	4.747	4.493	4.108	3.449	2.608	1.676	0.737	1.48

The initial thickness of the specimen was 19.0 mm and at the end of the test the water content was 19.8%. The specific gravity  $G_s = 2.73$ .

- (a) Determine the preconsolidation pressure. What are the maximum and minimum possible values of the preconsolidation pressure?
- (b) Determine the values of the coefficient of volume change for stress increment 100-200  $\text{kN/m}^2$  and 1000-1500  $\text{kN/m}^2$ .
- c) Determine the compression index.
- (d) If the clay specimen was taken from a depth of 20 m of a saturated clay layer. The saturated clay layer extends from the ground surface to 50 m deep. Determine whether this clay is normally consolidated or overconsolidated? Note that the ground water table is at the ground surface.
- (e) If the clay specimen was taken from a depth of 35 m, then what can you say about the clay?