CE 381 : Engineering Properties of Soils and their Measurements

Homework#3

1. The results of standard Proctor test are given in the following table. Determine the maximum dry unit weight of compaction and the optimum moisture content. Also, determine the moisture content required to achieve 95% of $\gamma_{d(max)}$.

Volume of proctor mold (cm3)	Mass of wet soil in the mold (kg)	Moisture content (%)
943.3	**1.68**	**9.9**
943.3	**1.71**	**10.6**
943.3	**1.77**	**12.1**
943.3	**1.83**	**13.8**
943.3	**1.86**	**15.1**
943.3	**1.88**	**17.4**
943.3	**1.87**	**19.4**
943.3	**1.85**	**21.2**

2. A field unit weight determination test for the soil described in Problem (1) yielded the following data: moisture content = 10.2% and moist unit weight = 16.7 kN/m^3 . Determine the relative compaction.

3. A proposed embankment fill requires 5000 m^3 of compacted soil. The void ratio of the compacted fill is specified as 0.7. Four borrow pits are available as described in the following table, which lists the respective void ratios of the soil and the cost per cubic meter for moving the soil to the proposed construction site. Make the necessary calculations to select the pit from which the soil should be bought to minimize the cost. Assume G_s to be the same at all pits.

Borrow pit	Void ratio	Cost ($/m3)
A	**0.85**	**9**
B	**1.2**	**6**
C	**0.95**	**7**
D	**0.75**	**10**

4. The relative compaction of a sand in the field is 92%. The maximum and minimum dry unit weights of the sand are 16.60 kN/m^3 and 15.00 kN/m^3, respectively. For the field condition, determine

a. Dry unit weight
b. Relative density of compaction
c. Moist unit weight at a moisture content of 10%