Geotechnical Engineering Prepatory Quiz

FE Review Preparation Quiz

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1   Multiple Choice   1 point

A 12-ft-high retaining wall has backfill of granular soil with an angle of internal friction of 30° and a unit weight of 125 pcf. The resultant Rankine active force (lb/ft) on the wall is most nearly:

- ○ 27,000
- ○ 9,000
- ○ 3,000
- ○ 2,250

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2   Multiple Choice   1 point

A consolidated, undrained triaxial shear test was performed on an overconsolidated clay mix specimen with a diameter of 1.4 in. The test yielded a cohesion of 530 psf and an angle of internall friction of 18°. If the normal load at failure was 125 lb, the shear strength (psi) of the soil is most nearly:

- ○ 30
- ○ 556
- ○ 26
- ○ 10

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3   Multiple Choice   1 point

A normally consolidated 10-ft clay layer is surcharged, which causes a decrease in thickness. The coefficient of consolidation is 0.16 ft^2 per day and the time factor is 1.2 for U = 50%. The clay layer is confined between two layers of dense sand. The time (days) required for 50% consolidation is most nearly:

- ○ 5
- ○ 188
- ○ 38
- ○ 750

4

Multiple Choice   1 point

A slope of clay-mix material experiences failure along a 100-ft-long slip surface at an angle of 27°. The soil above the slip surface weighs 100 tons, has an angle of internal friction of 20°, and has a cohesion of 1.2 psi. The factor of safety at slope failure is most nearly:

- ○ 0.7
- ○ 381.3
- ○ 1.7
- ○ 0.9

5

Multiple Choice   1 point

A strip of footing having a width $B = 2$ ft is to be constructed at ground suface ($D_f = 0$). Underlying the footing is sand having the following bearing capactiy factors: $N_c = 0$, $N_\gamma = 25$, $N_q = 20$. The unit weight of sand $\gamma = 120$ pcf. The ultimate bearing capacity q_{ult} (psf) of the footing is most nearly:

- ○ 3,000
- ○ 1,200
- ○ 4,800
- ○ 2,400

6

Multiple Choice   1 point

A three-story concrete building will be constructed on a vacant parcel in a city. The soil boring log shows a 20-ft-thick layer of loose soil over a 5-ft-thick limestone layer. Which of the following foundations will provide the least settlement for this building?

- ○ Mats foundation
- ○ Spread footings
- ○ Deep foundation
- ○ Wall foundation

7

Multiple Choice   1 point

An undisturbed sample of soil has a specific gravity of solids of 2.70, a moisture content of 10.5%, and void ratio of 0.63. The degree of saturation is most nearly:

- ○ 25%
- ○ 85%
- ○ 65%
- ○ 45%

8
Multiple Choice 1 point

Direct shear test data of a sand are shown below:

Area of sample = 16 in²
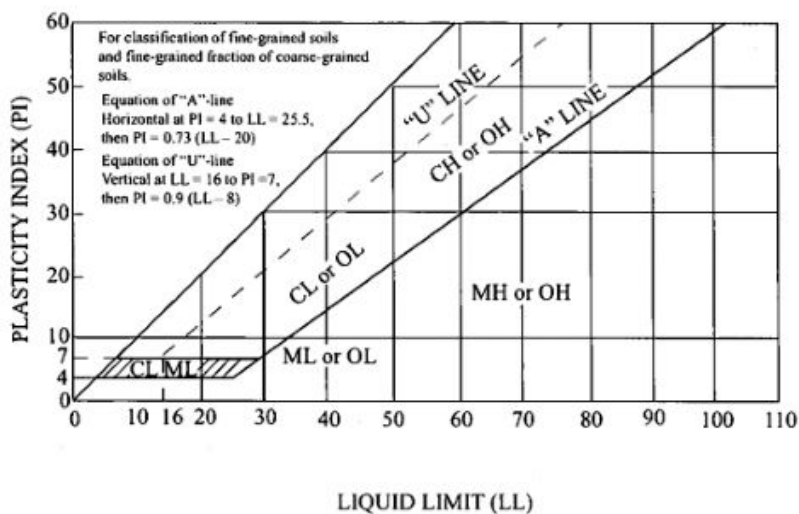Normal load at failure = 512 lb
Shear stress at failure = 16 psi

The angle of internal friction is most nearly:

- ○ 0°
- ○ 30°
- ○ 27°
- ○ 63°

9
Multiple Choice 1 point

Subsurface exploration indicates that a level site has a 10-ft upper layer of sand. The groundwater table is at the ground surface. The unit weight of the sand is 135.0 pcf. The effective overburden stress (psf) at a depth of 10 ft is most nearly:

- ○ 625
- ○ 1,350
- ○ 725
- ○ 1,975

10
Multiple Choice 1 point

Which area of the Atterberg chart provided is associated with an elastic silt?

- ○ CH or OH
- ○ MH or OH
- ○ ML or OL
- ○ CL or OL