Results and Feedback from Quiz

Name: Karun Joseph
Total Points: 4 / 49 = 8%
Date started: 10/11/2016 3:06:57 PM
Date finished: 10/11/2016 3:24:55 PM

Module: A

Question 1.

Infiltration capacity is likely to be larger where

- [ ] Hydraulic conductivity is small
- [x] Hydraulic conductivity is large

Points for Question: 1/1

Feedback:
Correct

Question 2.

Infiltration excess overland flow is likely to be larger where

- [ ] hydraulic conductivity is large.
- [x] hydraulic conductivity is small.

Points for Question: 1/1

Feedback:
Correct!

Question 3.

Hydraulic conductivity is likely to be large for

- [x] sandy soils.
- [ ] clayey soils.

Points for Question: 1/1

Feedback:
Correct!

Question 4.

Porosity is defined as

- [x] volume of voids/total volume.
- [ ] volume of voids/volume of solids.
- [ ] volume of water/volume of solids.

- [ ] volume of air/volume of water.
- [ ] mass of water/density of soil.

Points for Question: 1/1

Feedback:
Correct!

Question 5.

Volumetric moisture content is defined as

- [ ] volume of air/volume of water.
- [ ] mass of water/density of soil.
- [ ] volume of water/total volume.
- [x] volume of water/volume of solids.
- [ ] volume of voids/total volume.

Points for Question: 0/1

Feedback:
Volumetric moisture content is defined as volume of water/total volume.

Question 6.

Degree of saturation is defined as

- [x] (A) volumetric moisture content/porosity.

- (B) volume of water/volume of voids.
- (C) volume of water/total volume.
- (D) volume of water/volume of solids.
- Both A and B.
- Both A and C.
- Both B and C.
- A, B, C
- B, C, D
- A, B, C, D

Points for Question: 0/1

Feedback:
Degree of saturation is defined as both A and B; volumetric moisture content/porosity = volume of water/volume of voids.

Module: B_Soil Moisture Content

Question 7.

Field and oven-dry weights of soil samples taken with a 10 cm long by 5 cm diameter cylindrical tube are given in the accompanying table. Assuming ρ_m=2650 kg/m^3 = 2.65 g/cm^3, calculate the volumetric soil moisture content, degree of saturation, bulk density and porosity of those soils.

Field mass	**g**	**468.3**
Oven dry mass	**g**	**441.7**
Bulk Density	**g/cm^3**	
Porosity		

Volumetric water content	
Degree of saturation	

Points for Question: 0/4

Feedback:

Soil		**D**
Field mass	**g**	**468.3**
Oven dry mass	**g**	**441.7**
Bulk Density	**g/cm^3**	2.250
Porosity		0.151
Volumetric water content		0.135
Degree of saturation		0.897

Question 8.

Field and oven-dry weights of soil samples taken with a 10 cm long by 5 cm diameter cylindrical tube are given in the accompanying table. Assuming ρ_m=2650 kg/m^3 = 2.65 g/cm^3, calculate the volumetric soil moisture content, degree of saturation, bulk density and porosity of those soils.

Field mass	**g**	**390.5**
Oven dry mass	**g**	**374.5**
Bulk Density	**g/cm^3**	
Porosity		
Volumetric water content		
Degree of saturation		

Points for Question: 0/4

Feedback:

Bulk Density	**g/cm^3**	1.907
Porosity		0.280
Volumetric water content		0.081
Degree of saturation		0.291

Module: C

Question 9.

Indicate which (more than one) of the following instruments may be used to measure soil moisture:

- [ ] Electrical resistance block
- [ ] Infrared satellite sensor
- [ ] Capacitance probe
- [ ] Time domain reflectometry probe
- [ ] Thermometer
- [ ] X-Ray sensor
- [ ] Microwave satellite sensor
- [ ] Hygrometer
- [ ] Neutron probe

Points for Question: 0/5

Feedback:
The following instruments may be used to measure soil moisture:
Electrical resistance block, Capacitance probe, Time domain reflectometry probe, Microwave satellite sensor, and Neutron probe.
You need to get all five to get the score. (System limitation!)

Module: D_Soil Texture

Question 10.

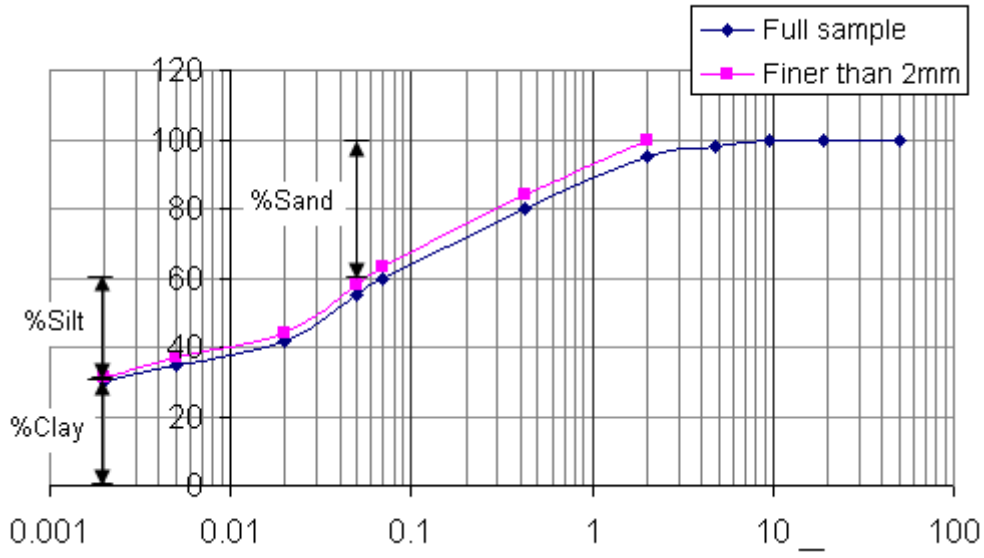
Plot a grain size distribution curve and determine the soil texture for the following soil sieve analysis data.

Diameter (mm)	Percentage passing
50	100
19	100
9.5	100
4.76	98
2	95
0.42	80
0.074	60
0.020	42
0.005	35
0.002	30

- [ ] sand
- [ ] loamy sand
- [ ] sandy loam
- [ ] silt loam
- [ ] loam
- [ ] silt
- [ ] sandy clay loam
- [ ] silty clay loam
- [ ] clay loam
- [ ] sandy clay
- [ ] silty clay
- [ ] clay

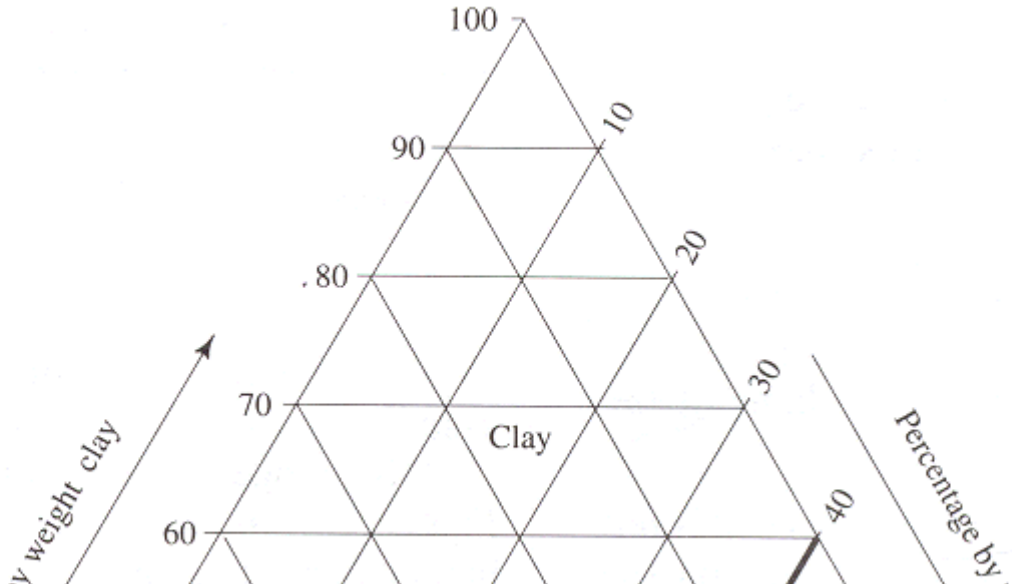
Points for Question: 0/2

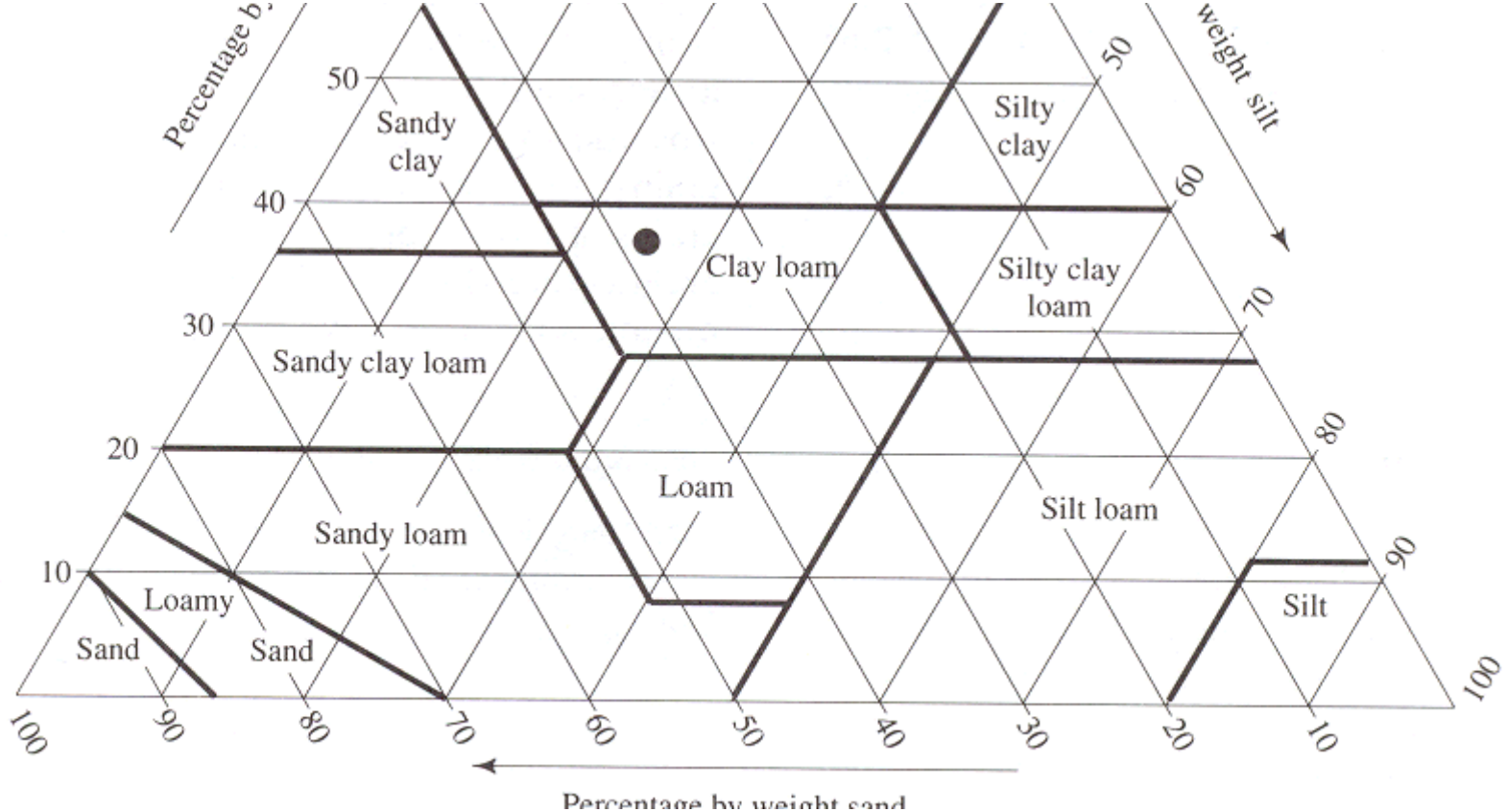
Feedback:



%Sand	%Silt	%Clay
41.93	26.49	31.58

Plotting these values on the soil texture triangle (figure 23 workbook) gives:





The soil is "Clay Loam"

Module: E_Intrinsic Permeability

Question 11.

Hydraulic conductivity is determined in a Darcy experiment conducted using water at 20 ^{o}C to be 25 cm/hr. The viscosity of water at 20 ^{o}C is 1.05 x 10^{-3} N s m^{-2}. Using g=9.81 m/s^2 and ρ_w=1000 kg/m^3 calculate the intrinsic permeability of this material. (Use the format: ###.##E-## to type in scientific numbers, e.g. 3.2 x 10^{-5}= 3.2E-5)

Points for Question: 0/2

Feedback:

$$k = \frac{\mu}{\gamma} K = \frac{\left(1.05 \times 10^{-3}\right) \times \left(30 \times 10^{-2}\right)}{1000 \times 9.81 \times 3600} \times 10^{4} = 7.43 \times 10^{-8} \text{ cm}^2$$

$$\text{units}: \frac{\left(\text{N s m}^{-2}\right)\left(\text{m/hr}\right)}{\left(\text{kg m}^{-3}\right)\left(\text{m s}^{-2}\right)\left(\text{s/hr}\right)} \left(\text{cm}^2/\text{m}^2\right)$$

Module: F_Darcy Experiment

Question 12.

Following is data from a Darcy experiment using the notation depicted in figure 25. Fill in the blanks and calculate the hydraulic conductivity. The internal diameter of the circular tube used was 10 cm and the length Δl, between piezometers, 40 cm. This experiment is conducted at 20 ^{o}C.

h_1 (cm)	70
h_2 (cm)	58
z_1(cm)	50
z_2 (cm)	30
n	0.32
Q (l/hr)	0.5
Ψ_1(cm)	
Ψ_2(cm)	
p_1(Pa)	
p_2(Pa)	
dh/dl	
q (cm/hr)	
K (cm/hr)	
k (cm^2)	
V (cm/hr)	

Re	

Points for Question: 0/10

Feedback:

h_1(cm)	70
h_2 (cm)	58
z_1(cm)	50
z_2 (cm)	30
n	0.32
Q (l/hr)	0.5
Ψ_1(cm)	**20**
Ψ_2(cm)	**28**
p_1(Pa)	**1962**
p_2(Pa)	**2747**
dh/dl	**0.3**
q (cm/hr)	**6.37**
K (cm/hr)	**21.22**
k (cm^2)	**6.31E-08**
V (cm/hr)	**19.9**
Re	**7.48E-05**

Module: G_Soil Moisture

Question 13.

Consider the following soil with parameters from Table 1. Evaluate the field capacity moisture content, θ_{fc}, at which pressure head is -340 cm, permanent wilting point moisture content, θ_{fc}, at which the pressure head is -15000 cm and plant available water, θ_a, using the Clapp and Hornberger (1978) soil moisture characteristic parameterization.

Texture	Porosity n	$\lvert\Psi_a\rvert$(cm)	b	θ_{fc}	θ_{pwp}	θ_a
loamy sand	0.41	9	4.38			

Points for Question: 0/3

Feedback:

Texture	Porosity n	$\|\psi_a\|$ (cm)	b	θ_{fc}	θ_{pwp}	θ_a
loamy sand	0.41	9	4.38	0.179	0.075	0.104

Question 14.

Consider the following soil with parameters from Table 1. Evaluate the field capacity moisture content, θ_{fc}, at which pressure head is -340 cm, permanent wilting point moisture content, θ_{fc}, at which the pressure head is -15000 cm and plant available water, θ_a, using the Clapp and Hornberger (1978) soil moisture characteristic parameterization.

Texture	Porosity n	$\|\psi_a\|$(cm)	b	θ_{fc}	θ_{pwp}	θ_a
sandy loam	0.435	21.8	4.9			

Points for Question: 0/3

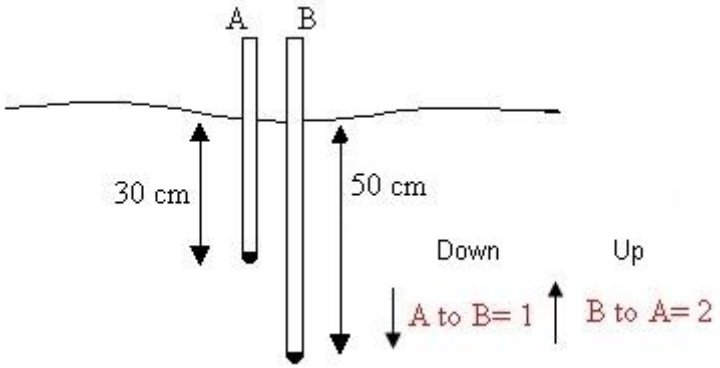
Feedback:

Texture	Porosity n	$\|y_a\|$ (cm)	b	θ_{fc}	θ_{pwp}	θ_a
sandy loam	0.435	21.8	4.9	0.248	0.115	0.134

Module: H_Darcy Experiment

Question 15.

Consider the following experimental situation. A and B are vertical tensiometers that measure pore water pressure (tension) relative to atmospheric pressure, at depths 30 and 50 cm below the ground.



Following are some pressure measurements recorded at A and B. Negative denotes suction. For each situation evaluate the pressure head at A and B, and total head at A and B using the surface as a datum. Indicate the direction of flow (i.e. 1= downwards into the ground from A to B, or 2= upwards from B to A) (Include minus sign for negative numbers)

Pressure at A (Pa)	-4000
Pressure at B (Pa)	-3000
Ψ at A (cm)	
Ψ at B (cm)	
Total head at A (cm)	
Total head at B (cm)	
Direction of flow (indicate 1 or 2)	

Points for Question: 0/5

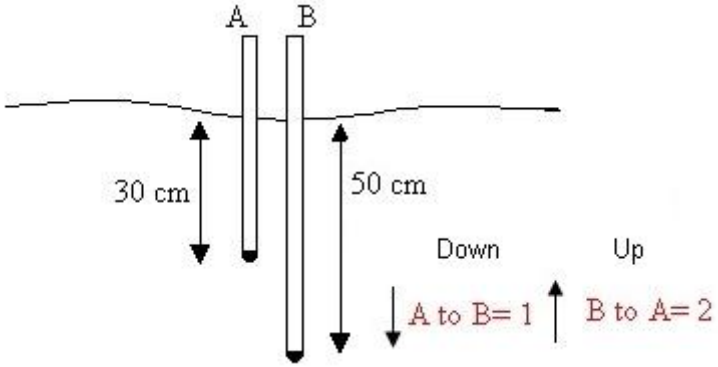
Feedback:

Pressure at A (Pa)	-4000
Pressure at B (Pa)	-3000
Ψat A (cm)	-40.8
Ψat B (cm)	-30.6
Total head at A (cm)	-70.8
Total head at B (cm)	-80.6
Direction of flow	1

Module: I_Darcy Experiment

Question 16.

Consider the following experimental situation. A and B are vertical tensiometers that measure pore water pressure (tension) relative to atmospheric pressure, at depths 30 and 50 cm below the ground.



Following are some pressure measurements recorded at A and B. Negative denotes suction. For each situation evaluate the pressure head at A and B, and total head at A and B using the surface as a datum. Indicate the direction of flow (i.e. 1= downwards into the ground from A to B, or 2= upwards from B to A) (Include minus sign for negative numbers)

Pressure at A (Pa)	-5500
Pressure at B (Pa)	-3000
Ψ at A (cm)	
Ψ at B (cm)	
Total head at A (cm)	
Total head at B (cm)	
Direction of flow	

Points for Question: 0/5

Feedback:

Pressure at A (Pa)	-5500
Pressure at B (Pa)	-3000
Ψ at A (cm)	-56.1
Ψ at B (cm)	-30.6
Total head at A (cm)	-86.1
Total head at B (cm)	-80.6
Direction of flow	2

Done

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National Weather Service COMET Outreach Program

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