

**SOIL 200**  
**Midterm Examination**  
**Feb 23, 2005**

Please read the question carefully and attempt each question. Allocate your time according to the marks assigned for each question. Please note that the total time of the exam is 50 minutes.

**KEEP CALM!**

<b>Time (min)</b>	<b>Marks (%)</b>
-----------------------	----------------------

- |    |    |  |
|----|----|--|
| 12 | 30 | <b>❶</b> Define each of the following terms and identify important distinctions between paired terms:<br><br>(a) regolith and solum<br>(b) mass flow of a gas and diffusion of a gas<br>(c) permanent wilting point and field capacity<br>(d) fine earth and coarse fragments<br>(e) montmorillonite and kaolinite   |
| 8  | 16 | <b>❷</b> Symbol “ $\lambda$ ” is used for what soil property?<br>Define the property in question.<br>Explain how the property in question is affected by water content and type of solids.   |
| 10 | 16 | <b>❸</b> If a soil has a bulk density of $1.71 \text{ g/cm}^3$ and a particle density of $2.65 \text{ g/cm}^3$ .<br><br>(a) What portion of the soil volume is occupied by pores and what portion of the soil volume is occupied by solid particles?<br><br>(b) Based on your calculations what can you say about the quality of this soil for plant growth? |

*Show the whole calculation, including the units!*

10

18

④ A soil has the following properties:

pore volume =  $0.55 \text{ m}^3$ ,

air entry value of soil water tension =  $0.005 \text{ m}$ ,

Volume of water =  $0.19 \text{ m}^3$ ,

field capacity =  $0.28 \text{ m}^3/\text{m}^3$ ,

permanent wilting point =  $0.11 \text{ m}^3/\text{m}^3$

(a) What was the available water storage capacity ( $\text{m}^3/\text{m}^3$ )?

(b) What was the soil air volume ( $\text{m}^3$ )?

(c) Calculate the radius of the largest pores in this soil (m).

[Remember:  $g$  is gravitational acceleration =  $9.81 \text{ m/s}^2$ ;  $\rho_w$  is the density of water =  $1000 \text{ kg/m}^3$ ;  $\tau$  is the surface tension of water against air =  $0.074 \text{ N/m}$ ; and  $\phi$  is the wetting angle =  $0$ , while  $\cos 0 = 1$ ]

*Show the whole calculation, including the units!*

10

20

⑤ (a) What major types of aggregate (ped) shapes are recognized?

(b) What processes contribute to aggregate formation? Explain.

(c) What kinds of materials contribute to aggregate stabilization?

**Time  
(min)**

**Marks  
(%)**

---

50

100

**THE END**