1. (a) Define **saline soils** and **sodic soils**. (b) What are the three key requirements needed to accomplish reclamation of salt-affected soils? (c) How does reclamation of **sodic soils** differ from reclamation of **saline soils**? (10 %)

2. (a) What is meant by **buffering**? Why is it so important in soils, and what are the mechanisms by which it occurs? (b) Explain why two soils might have different buffering capacities? (10 %)

3. Compare the differences in crystalline structure, charge characteristics, CEC, specific surface area, particle size, and fixation ability of potassium ion and phosphates among **kaolinite**, ***smectites***, ***fine-grained micas***, **vermiculites**, **chlorites**, and **humus**. (10 %)

4. Draw a simple diagram of the hydrologic cycle using a separate arrow to represent these processes: **evaporation, transpiration, infiltration, interception, percolation, surface runoff,** and **soil storage**. (10 %)

5. Suppose you measured the following data for a soil:

		Θ_m at different water tension, kg water/kg dry soil		
Horizon	**Bulk density, Mg/m^3**	**-10 kPa**	**-100 kPa**	**-1500kPa**
A (0-30 cm)	1.28	28	20	8
B_x (30-70 cm)	1.40	30	25	15
C (70-100 cm)	1.95	20	15	5

Estimate the total available water holding capacity (AWC) in kilograms of water per kilograms of dry soil. (10 %)

6. In what ways are soils involved in **the greenhouse effect** that is thought to be warming up the earth? What are some common soil-management practices that could be changed to mitigate the negative effects and increase the beneficial effects of soil on the greenhouse effect? (10 %)

7. Discuss the benefits and ill effects of **sulfur and nitrogen** that are added to soils by humans and natural processes each year. (10 %)

8. Discuss the concept of the **limiting factor** and indicate its importance in enhancing or constraining plant growth. (10 %)

9. What is **bioremediation**, and what are its advantages and disadvantages compared with physical and chemical methods of handling **organic wastes**? (10 %)

10. What is **soil quality** or **soil health**, how is it measured, and of what importance is it to all organisms that live in or on the soil? (10 %)

試題隨卷繳回