



The Open University of Sri Lanka
Faculty of Engineering Technology
Technology/Industrial Studies program
Final Examination 2007/2008
AEX5232 Soil Plant Water Relationship

Date : 15-05-2008
Time : 0930-1230 hours

SECTION 2: Answer any four (04) questions. All questions carry equal marks.

1. Briefly explain the soil moisture characteristic curve and discuss the importance of soil moisture tension on irrigation scheduling.
2. (a) How do you measure the of hydraulic conductivity in a steady state condition using a horizontal column of soil?

(b) Consider two cases of steady downward percolation through a two layered soil profile, the top of which is submerged under a 0.8 m head of water and the bottom of which is defined by a water table. Each of the two layers is 0.4 m thick. In the first case, the conductivity of the top layer is 10^{-4} m/sec and that of the sub layer is 10^{-5} m/sec. In the second case, the same layers are reversed. (i.e. the less conductive soil over the more conductive). Calculate the flow and the hydraulic pressure heads at the interface between the layers for each of the two cases.
3. (a) Briefly explain the terms gravitational potential, matrix potential, pressure potential and total potential.
(b) Two points A and B have metric potential of -100cm and -90cm respectively. A is directly above B by 5 cm. Calculate the soil water potentials at points A and B and determine the direction of water movement.
4. (a) Briefly explain how water deficits develop in plants
(b) Discuss the effect of water deficit on growth, physiological and metabolic processes of plants.
5. (a) Briefly describe the importance of soil aeration on plant growth.
(b) Consider a soil profile in which the air-phase oxygen concentration diminished linearly from 21% at the soil surface to half of that at 100 cm depth. The total porosity is 40% and the volume wetness is 35%. Calculate the diffusion rate using Penman's coefficient of oxygen in the soil (D_s). Assume steady state diffusion. Use a value of 1.89×10^{-5} for the bulk air diffusion coefficient.
6. Write short notes on any three (03) of the following.
 - (a) Fertility erosion in agricultural lands
 - (b) Importance of Soil Colour in agriculture
 - (c) Soil moisture measurement
 - (d) Hysteresis of soil