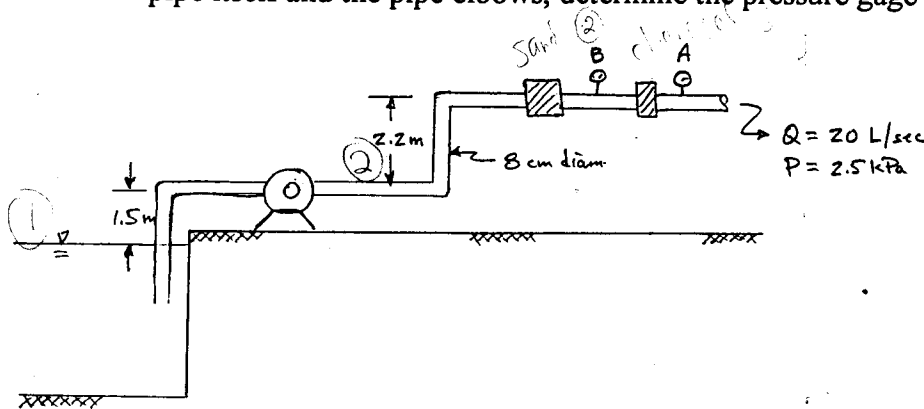


Exam II

(points)

- (10) 1. The Bowen Ratio, β , is used to simplify energy balance calculations of evaporation and evapotranspiration. Please provide short answers to the following:
- What does β physically represent in the energy balance?
 - At what magnitude of β are ET calculations based on the energy balance unreliable? Why?
- (30) 2. Given the data in the attached figure for an avocado orchard along the south coast of California, determine the following:
- If the total applied irrigation water was 63.0 in. what is the average daily ET (in/day) of the orchard for the 800-day period (assume an interception loss of 12%)?
 - Given an average net solar radiation of $625 \text{ cal/cm}^2\text{-d}$, estimate the mean air temperature ($^{\circ}\text{C}$) during the 800-day period.
- (30) 3. The pump shown in the sketch below supplied 1554 kW to the water drawn from the reservoir so as to maintain a 30 L/sec flowrate through the cylindrical sand and charcoal filters. Neglecting head losses associated with the entrance/exit conditions of the filters, within the pipe itself and the pipe elbows, determine the pressure gage readings (kPa) at gages A and B.



Head loss = $\frac{Q^2}{K}$

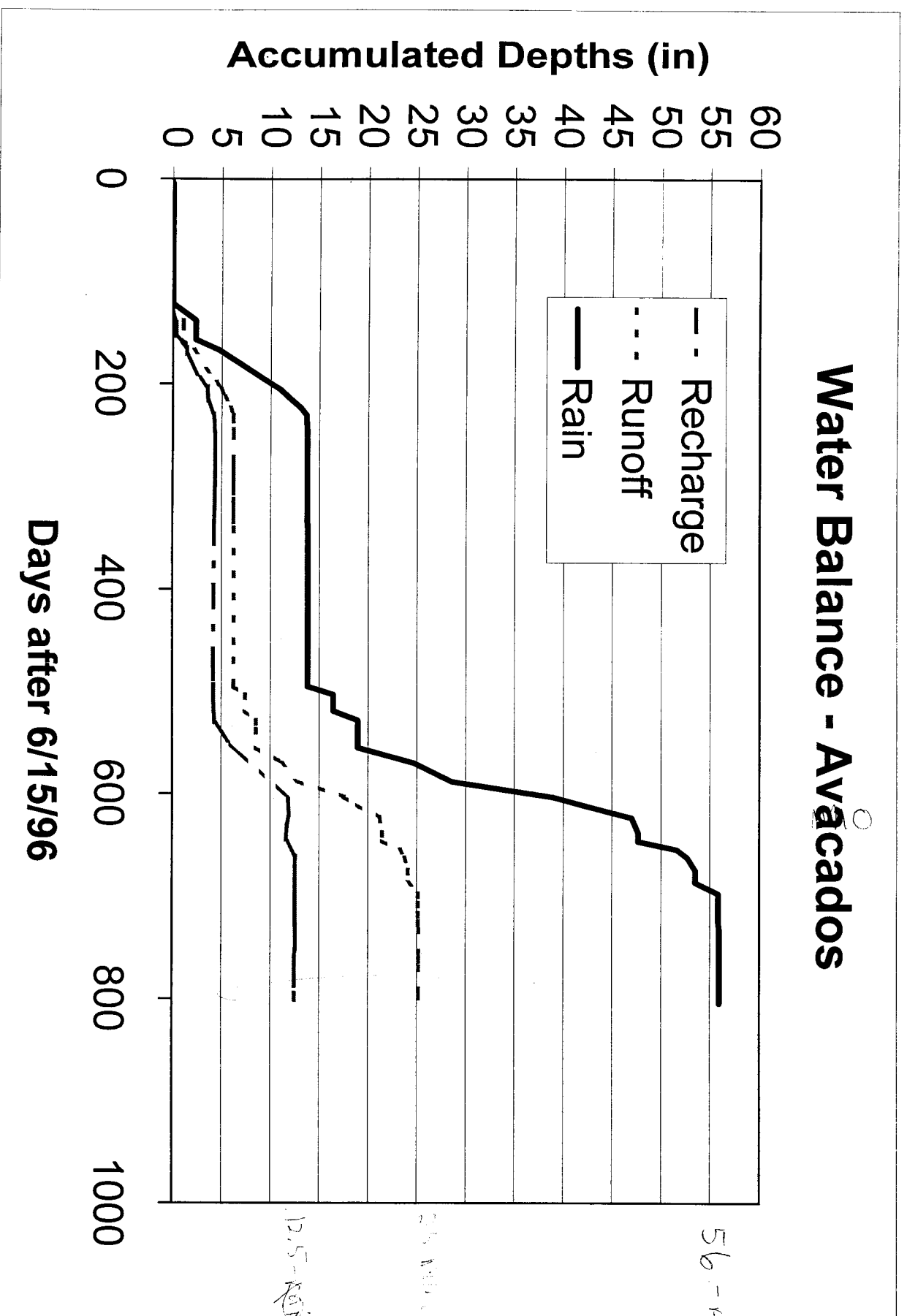
Filter Characteristics	
Sand	Charcoal
L = 20 cm	L = 10 cm
D = 15 cm	D = 15 cm
$K_s = 10^{-2} \text{ cm/s}$	$K_c = 2 \times 10^{-3} \text{ cm/s}$

- (30) 4. A sub-alpine wetland is situated on top of an alluvial deposit of fine soil overlaying a very deep, coarser-textured sand/decomposed-granite mixture. The wetland water depth of 2 feet is maintained by a small stream throughout the year allowing for a constant thickness organic detritus mat to form at the base of the water column. Soil cores collected from the site yielded the data tabulated below.

Organic layer	Fine soil	Decomposed granite
Thickness $\approx 4''$	Thickness $\approx ?$	Thickness $> 50'$
$K_{om} \approx 0.8 \times 10^{-4} \text{ in/sec}$	$K_{fs} \approx 7.5 \times 10^{-7} \text{ in/sec}$	$K_{dg} \approx 10^{-5} \text{ in/sec}$
$\lambda_{om} \approx 1.5$	$\lambda_{fs} \approx 1.8$	$\lambda_{dg} \approx 2.0$
$h_{dom} \approx 7''$	$h_{dfs} \approx 14''$	$h_{ddg} \approx 12''$
$\theta_m \approx 0.65$	$\theta_m \approx 0.60$	$\theta_m \approx 0.50$
$\theta_r \approx 0.40$	$\theta_r \approx 0.25$	$\theta_r \approx 0.20 \approx \theta_i$
saturated	saturated	$\theta_{dg} \approx 0.40$

- Estimate the average seepage rate (in/day) from the wetland.
- Estimate the average thickness (in) of the fine soil layer below the wetland.

Water Balance - Avacados



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