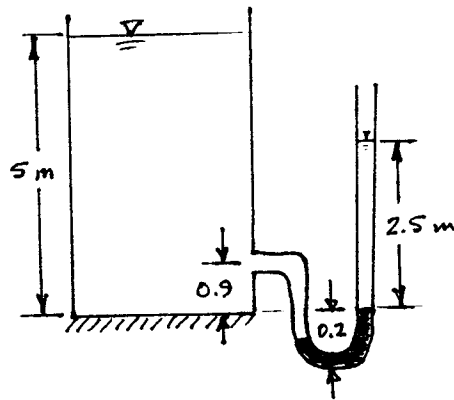


Read each question carefully and then logically reason through your answer. Be sure to write down all of your work for generous partial credit. Please also report your answer in a box using the units specified in the () of each problem statement. Good luck!

(Points)

- (20) 1. The Sacramento municipal wastewater treatment plant installed a free surface wetland treatment system for final metals removal and "polishing". The system consists of 10 cells, each 16 m wide \times 380 m long and designed to operate with a free-water surface depth of approximately 0.2 m. Last month, the average flow into each wetland cell was 378 m³/d while the measured outflow averaged 354 m³/d. The water level dropped from 23.4 cm at the beginning of the month to 20.8 cm at the end. Previous tracer studies in the wetland resulted in recovery of 78% of the conservative tracer from the system. Estimate the ET (cm) from the wetland cells for the month.
- (20) 2. Given the sketch below, determine the density (gm/cm³) of the shaded fluid in the manometer. The clear fluid is water.

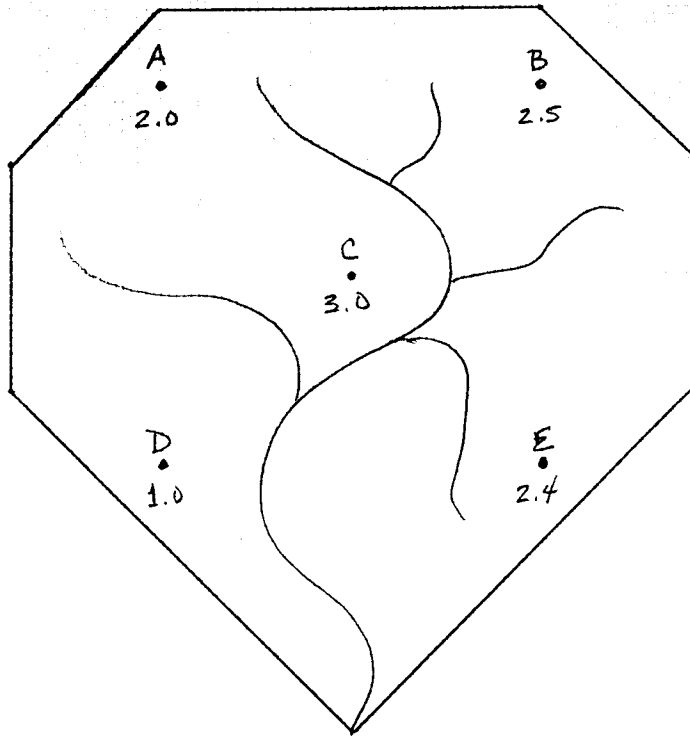


3. For the idealized mature Douglas Fir watershed shown on the attached graph, determine the following:
- (5) (a) the watershed area (ha);
- (10) (b) The average rainfall depth (cm) across the watershed based on the Thiessen polygon method;
- (5) (c) Which gages (letter) have the greatest influence on the average rainfall depth? Explain.
- (20) 4. The total direct runoff volume associated with the 2-hr rainfall event of #3b was measured as 72,000 m³. Estimate the infiltration and depressional storage losses (cm) in the watershed for this storm. Is this a good storm from which to construct at UHG? Explain.
- (20) 5. Given the 2-hr UHG for the watershed on the attached graph, determine the peak discharge (m³/sec) from the watershed for the storm of #3b if the baseflow from the watershed is a relatively constant 0.5 m³/sec.

#3. MATURE DOUGLAS FIR FORESTED WATERSHED

10 ha

Raingages reflect rain depths measured for 2-hr storm.



#5. 2-hr WHG for Watershed above

