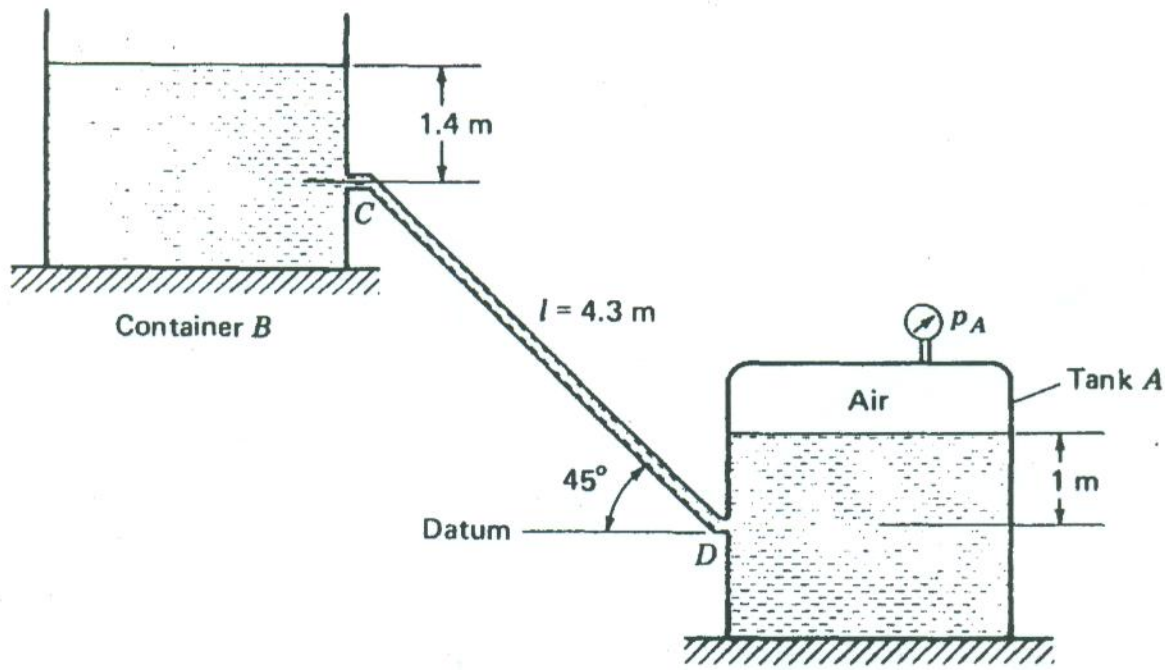
Tanta University
Faculty of Engineering
DEPARTMENT OF IRRIGATION AND HYDRAULICS ENGINEERING
EXAMINATION (2nd YEAR) STUDENTS OF Civil ENGINEERING

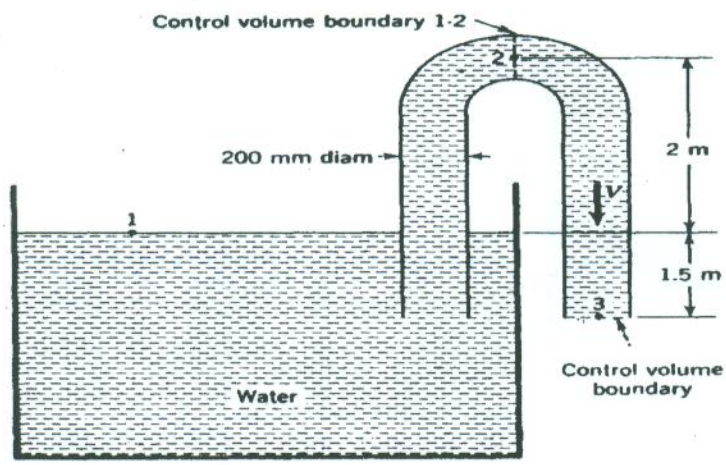
COURSE TITLE:FLUID MECHANICS
COURSE CODE
تخلفات

DATE: 20/1/2012 TERM:1ST TOTAL ASSESSMENT MARKS: 75 TIME ALLOWED: 3 HOURS



Problem # 4 (10marks)

The siphon of fig3. is filled with water and discharging at 150 liter/s. Find the losses from point 1 to point 3 in terms of velocity head $V^2/2g$. Find the pressure at point 2 if two thirds of the losses occur between points 1 and 2.



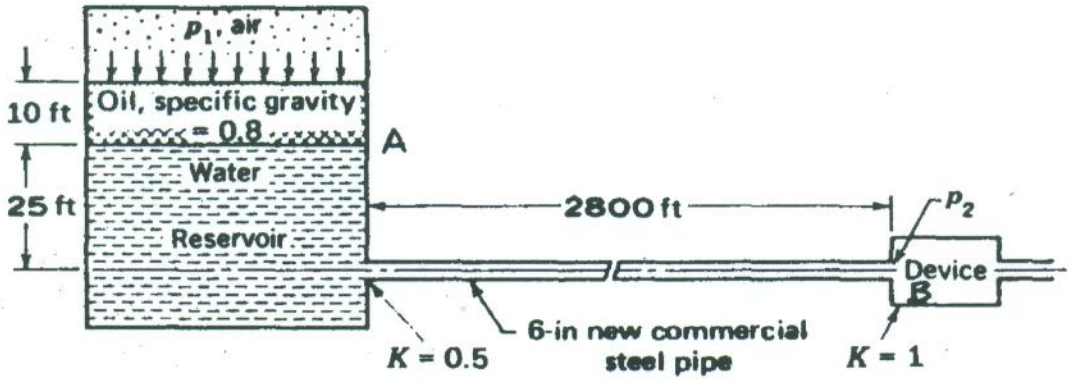
Problem # 5 (10 marks)

A pipe line ABCD of uniform diameter carrying water consists of three straight parts AB, BC and CD of lengths 40m, 160m and 60 m respectively. The levels above datum are as follows: A: 350m, B:345m, C:310m, D:300m. Pressure gages at A and D show pressures of 100 kPa and 650 kPa respectively. Determine the direction of flow and the

loss of head between the ends of the pipe line. Find also the pressure intensity at a section E of the pipe 136 m from A.

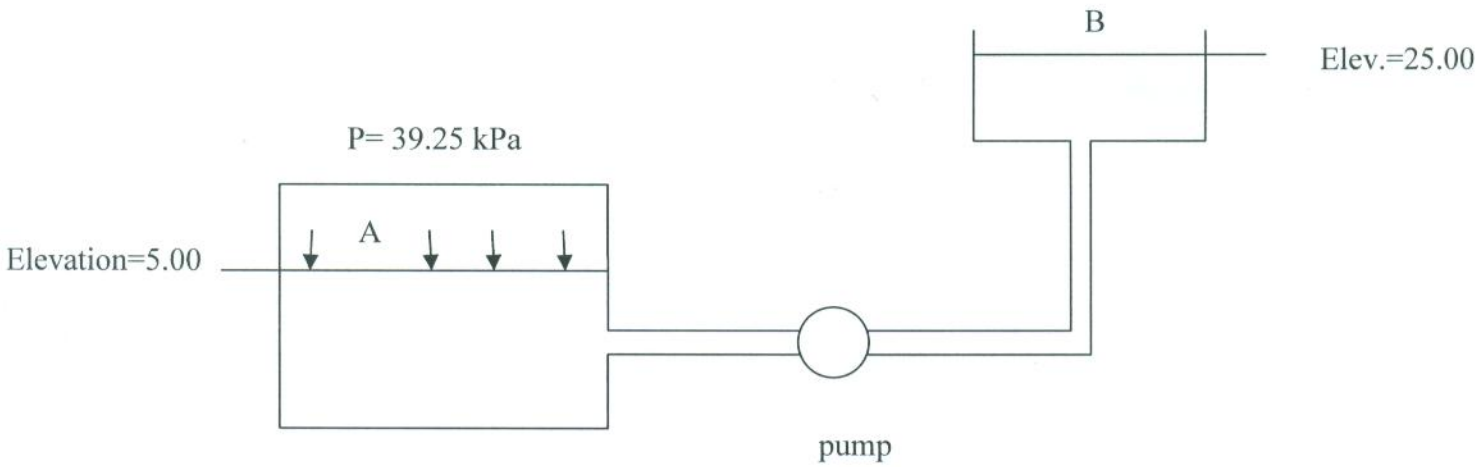
Problem # 6 (10 marks)

What pressure P_1 is required in fig.4 to cause 1 ft^3/s of water to flow, given P_2=5psi. Take $\mu = 2.11x10^{-5}$ $lb.s/ft^2$ for water and take friction factor of the 6-in new commercial steel pipe= 0.0175. Consider all losses. Draw T.E.L and H.G.L



Problem # 7 (10 marks)

A pump of power 9 kW with 85% efficiency is discharging oil of sp. gravity 0.85 to the overhead tank shown in fig5. If the total loss in the pipe is 1.2m of the flowing fluid, find the discharge.



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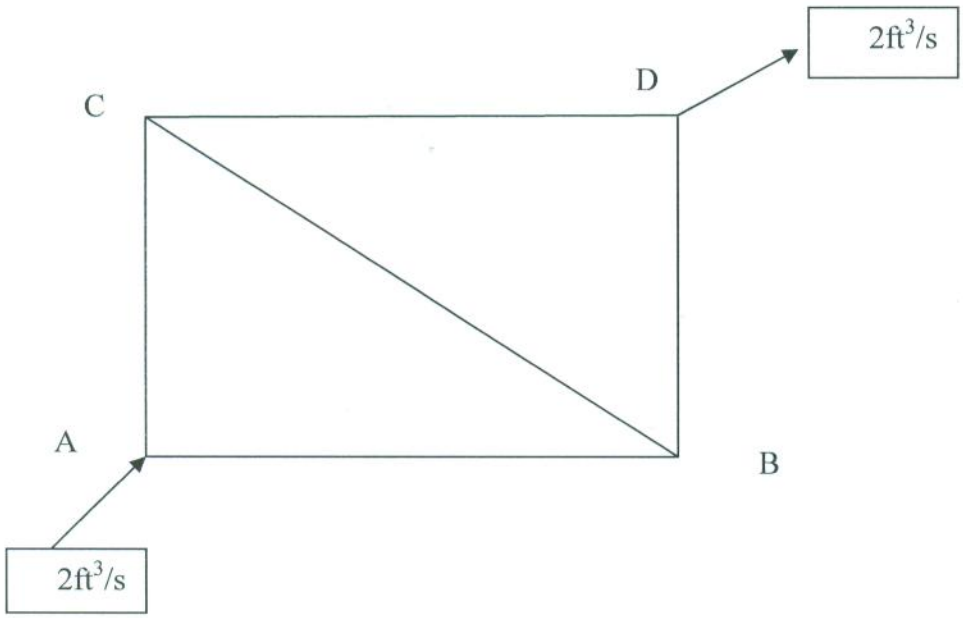
Problem # 8 (10 marks)

Determine the flow rates in fig.6. The fluid is water and all five pipes have friction factor f=0.0201.

Pipe	*AB*	*AC*	*CD*	*DB*	*CB*
Pipe length	*4000ft*	*3000ft*	*4000ft*	*3000ft*	*5000ft*
Pipe diameter	*8 in*	*6 in*	*8 in*	*3 in*	*9 in*



End of Questions

Best of Luck

Dr. Bakenaz Zedan

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Notes:
Systematic arrangement of calculations and clear neat drawings are essential.
Any data not given is to be assumed – Answer as many questions as you can.
Answer as brief as possible.

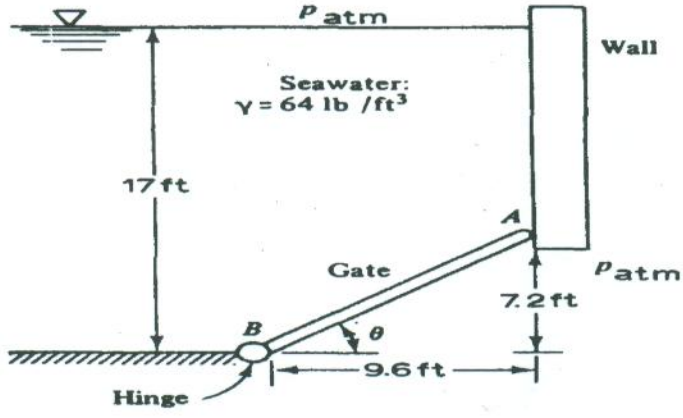
Problem # 1 (5 marks)

A) Prove that Bernoulli equation is dimensionly homogeneous, i.e. all terms of equation have the same dimensions. (2 marks)

B) A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 20 N.m is required to rotate the inner cylinder at 200 r.p.m., determine the viscosity of the fluid. (3 marks)

Problem # 2 (10 marks)

The gate in fig. 1, is 4 ft wide, is hinged at point B, and rests against a smooth wall at A. Compute (a) the force on the gate due to seawater pressure, (b)the (horizontal)force P exerted by the wall at point A and (c) the reaction at hinge B.



Problem # 3 (10 marks)

A capillary tube of inside diameter 6 mm connects tank A and open container B, as shown in fig.2. The liquid in A, B and capillary CD is water having specific weight of 9780 N/m3 and a viscosity of 0.0008 kg/(m.s). The pressure P_A= 34.5 kPa gage. Which direction will the water flow? What is the flow rate? Is the flow laminar?