University of Saskatchewan
Department of Mechanical Engineering
ME 215.3 Midterm Examination
March 3, 2004

Closed book exam.
Formula sheet provided.
This exam contains THREE questions

Instructor: J.D. Bugg
Time: 1.5 hours
Total Marks: 60

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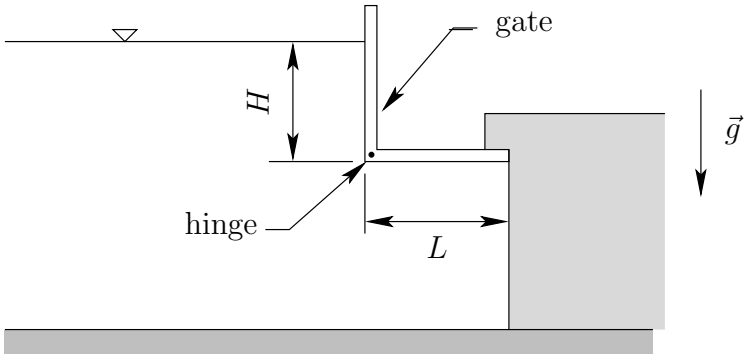
(10) 1. Carefully define the following terms.

(a) Uniform flow

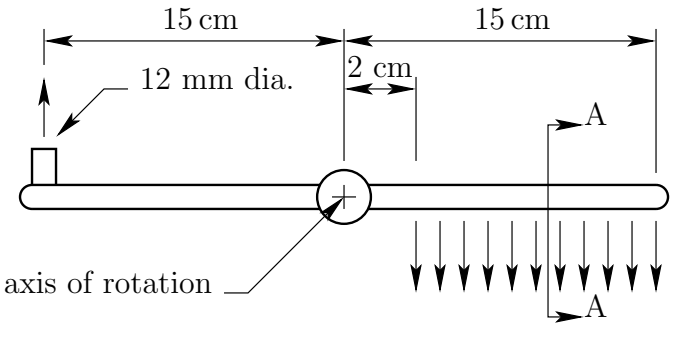
(b) Hydrostatic state

(c) Body force

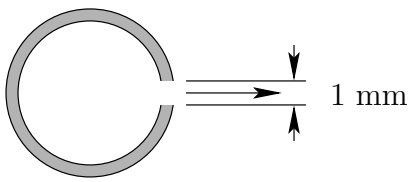
(25) 2. Determine H when the L-shaped gate shown is just about to open. Neglect the weight of the gate and let the density of the fluid be ρ.



(25) 3. A two-arm sprinkler is constructed as shown below. The total mass flow rate of water ($\rho = 1000\,\mathrm{kg/m^3}$) is 1 kg/s and it is divided equally between the two arms. At the end of one arm a 12 mm diameter nozzle is oriented perpendicular to the arm and is in the same horizontal plane as the arm. The other arm has a 1 mm wide slot that also emits water in the horizontal plane. Find the rotational speed of the sprinkler in revolutions per minute assuming that the pivot is frictionless.



Plan View



Section A-A
(enlarged)