Ministry of Higher Education Faculty of Engineering Kafrelsheikh University		وزارة التعليم العالي كلية الهندسة جامعة كفرالشيخ
Final Exam of Academic Year 2019 / 2020		
Department: Mechanical Engineering	Year: 1st term of Second year	Total Marks: 60
Course Title: Fluid Mechanics	Allowed Time: 3.0 Hours	Date: January 13, 2019

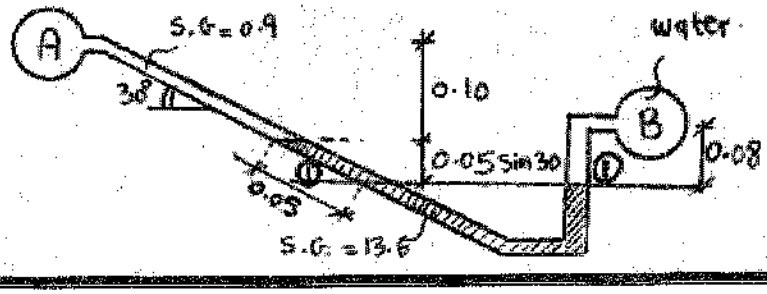
Please, answer the following questions.

Question (1)

A piece of pipe 30 cm long weighting 2.5 kg and having internal diameter of 5.125 cm is slipped over a vertical shaft 5.0 cm in diameter and allowed to fall under its own weight. Calculate the maximum velocity attained by the falling pipe if a film of oil having viscosity equals 0.5 Ib.s/ft^2 is maintained between the pipe and the shaft.

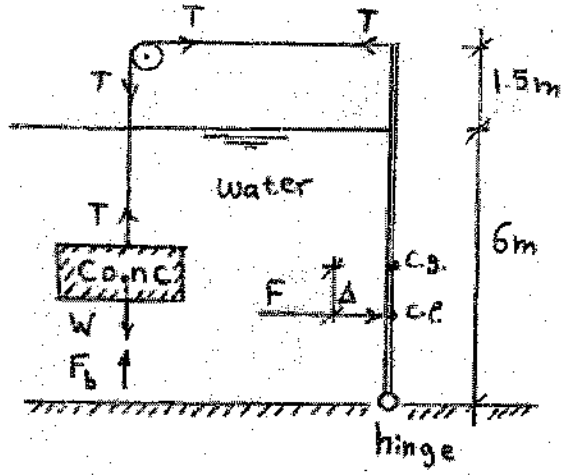
Question (2)

Determine the differential reading along the inclined leg of the mercury manometer shown below, if the pressure in pipe A is decreased 12 kPa and the pressure in pipe B remains unchanged. The fluid in A has a relative density of 0.9 and the fluid in B is water.



Question (3)

In the figure below, the width of the gate B= 2 m. Find the volume of the concrete block (S.G.= 2.42). Also, if the volume of the concrete block is reduced by 25%, calculate the new distance of the gate immersed into the water (h=??).



All the best

Dr./ F. A. Essa

Question (4)

A closed cylindrical tank with the air space subjected to a pressure of 14.8 psi., 1.9 m height and 09 m in diameter, contains 1.45 m of oil (S.G.=0.9). If the cylinder rotates about its geometric axis;

[1] When the angular velocity is 10 rad/sec, what are the pressures in bar at points C(center), D (front bottom), and S (lowest point of parabolic)?

[2] At what speed must the tank be rotated in order that the center of the bottom have zero depth?

Question (5)

An oil of relative density of 0.9 flows through a vertical pipe of diameter 20 cm. The flow is measured by 20 cm x 10 cm venturi meter. The throat is 10 cm above the inlet. A differential U-tube mercury manometer is connected to throat and inlet. Let Cd = 0.99, calculate the flow rate for reading 9 cm. Then, calculate the reading for a flow of 50 L/s.

Question (6)

Gasoline (S.G.=0.8) is flowing upwards through a vertical pipe line which tapers from 30 cm to 15 cm diameter. A gasoline mercury differential monometer is connected between 30 cm and 15 cm pipe section to measure the rate of flow. The distance between the monometer tapping is 1 meter, and gauge reading is 50 cm of mercury. a)- find the differential gauge reading in terms of gasoline head. b)-Using Bernoulli's equation and continuity equation find the rate of flow. Neglect friction and other losses between tappings.