INTERNATIONAL CENTRE FOR APPLIED SCIENCES
MAHE, MANIPAL

B.Sc. (Applied Sciences) in Engg.

End – Semester Theory Examinations – Nov./ Dec. 2020

III SEMESTER - FLUID MECHANICS (IME 234)

(Branch: Mechanical)

Time: 3 Hours **Date: 27 November 2020** **Max. Marks: 50**

- ✓ **Answer ALL the questions.**
- ✓ **Missing data, if any, may be suitably assumed**

1A). Define and write units if any: Viscosity, surface tension, Bulk modulus, relative density

1B). Derive expression for capillary fall.

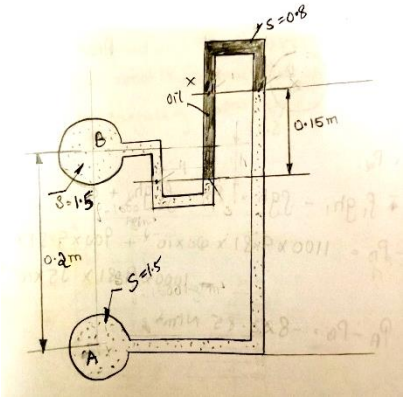
1C). In a 100mm long journal bearing arrangement, the clearance between the two at concentric condition is 1 mm. The shaft is 0.5m in diameter and rotates at 300rpm. The dynamic viscosity of the lubricant used is 0.5 Pas and the velocity variation in the lubricant is linear. Considering the lubricant to be Newtonian, calculate the frictional torque the journal has to overcome and the corresponding power loss.

(2+3+5)

2A). Name different manometers. Explain piezometer.

2B). State and Derive Hydrostatic Law.

2C). Find the pressure difference at between points A and B for the figure shown below.



(2+3+5)

3A). Derive expressions total pressure and centre of pressure when vertical surface submerged in liquid.

3B). A conical tube is fixed vertically with its smaller end upwards and it forms a part of pipeline. The velocity at the smaller end is 4.5 m/s and at the large end is 1.5 m/s. Length of the conical tube is 1.5m . The pressure at the upper end is equivalent to head of 10m of water

Neglecting the frictional loss, determine the pressure at the lower end tube

If head loss in the tube is $0.3\ (V_1-V_2)^2/2g$, where V_1 and V_2 are velocities at smaller and larger end respectively, determine the pressure at the larger end assuming flow downward.

(5+5)

4A). What is orifice? What do you mean by C_v, C_c and Cd referring to an orifice.

4B). Explain briefly: Steady and Unsteady flow, Unform and Non Uniform flow, Compressible and Incompressible fluid flow.

4C). The variable controlling the motion of a floating vessel in water are the drag force F, which depends on speed V, the length L, mass density p, dynamic viscosity μ and acceleration ln due to gravity g. Derive the expression for F using Buckingham's π-theorem.

(2+3+5)

5A). Derive an expression for actual discharge through orificemeter.

5B). Derive Darcy Weisbach equation and deduce the Chezy's equation from the same.

(5+5)

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