GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Engineering

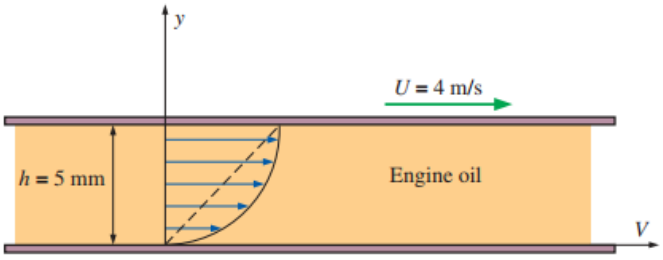
B.TECH Mechanical Engineering
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem IV - G3UB402C - BTME2025 - G3UB402B - Fluid Mechanics PBL

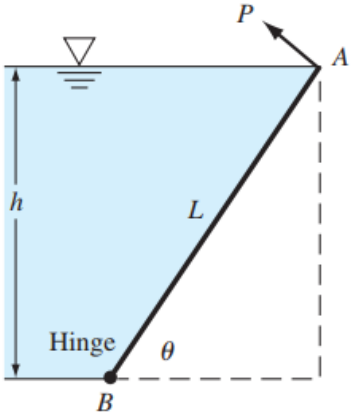
General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	What is the difference between streamlined and bluff bodies.	K1(2)
2)	The weight of a body is usually measured by disregarding buoyancy force applied by the air. Consider a 20-cm-diameter spherical body of density 7800 kg/m3. What is the percentage error associated with the neglecting of air buoyancy?	K2(4)
3)	Explain all minor loss briefly with neat sketch.	K2(6)
4)	Explain Reynolds no. and Mach no. . Also tell in which situation these numbers are used in similarity analysis.	K3(9)
5)	Demonstrate the working of Reciprocrating pump with diagram.	K3(9)
6)	A large plate is pulled at a constant speed of U = 4 m/s over a fixed plate on 5-mm-thick engine oil film at 20°C. Assuming a half-parabolic velocity profile in the oil film, as sketched, determine the shear stress developed on the upper plate and its direction. Compare the the values if a linear velocity profile were assumed?	K5(10)

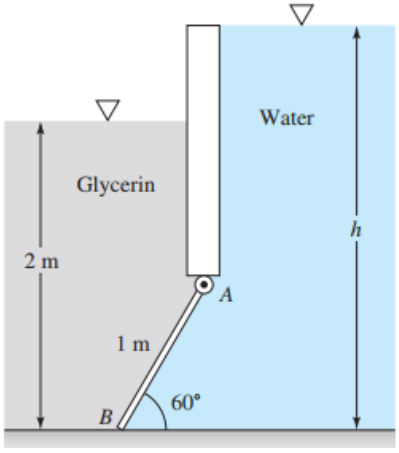


7)	Examine the following situation.Gate AB has length L and width b into the paper, is hinged at B, and has negligible weight. The liquid level h remains at the top of the gate for any angle θ. Find an analytic expression for the force P, perpendicular to AB, required to	K4(12)

keep the gate in equilibrium as in Fig.



8) Gate AB in Fig. is a homogeneous mass of 180 kg, 1.2 m wide into the paper, hinged at A, and resting on a smooth bottom at B. All fluids are at 20 degree celsius. Estimate For what water depth h will the force at point B be zero? γ = 12360 N/m3 for glycerin. K5(15)



9) Discuss the hydrodynamically fully developed flow in pipe and comment on entry length K5(15)

10) The conical container with a thin horizontal tube attached at the bottom, shown in Fig. is to be used to measure the viscosity of an oil. The flow through the tube is laminar. The discharge time needed for the oil level to drop from h1 to h2 is to be measured by a stopwatch. Develop an expression for the viscosity of oil in the container as a function of the discharge time t K6(18)