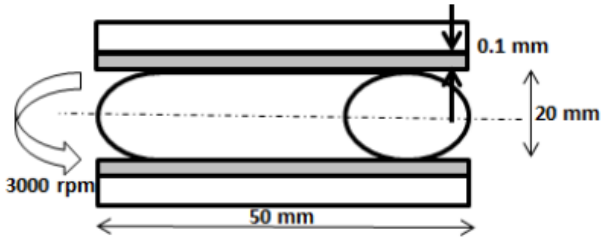
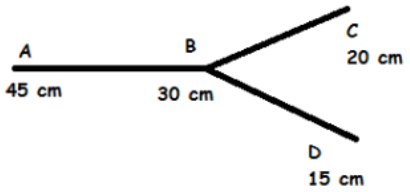
ENGG 111 Fluid Mechanics Assignment

1. Classify and describe different types of Newtonian and Non-Newtonian fluid with examples.
2. In a 50 mm long journal class bearing arrangement, the clearance between the two shafts in concentric condition is 0.1 mm. The shaft is 20 mm in diameter and rotates at 3000 rpm. The dynamic viscosity of lubricant used is 0.01 PaS and the velocity variation in the lubricant is linear. Considering the lubricant is Newtonian, calculate the frictional torque the journal has to overcome and the corresponding power loss.



3. A pipe AB branches into two pipes C and D as shown in figure below. The pipe has diameter of 45 cm at A, 30 cm at B, 20 cm at C and 15 cm at D. Determine the discharge at A if the velocity at A is 2 m/s. Also determine the velocities at B and D, if the velocity at C is 4 m/s.



4. A horizontal water pipe of diameter 15 cm converges to diameter 7.5 cm. If the pressures at two sections are 400 kPa and 150 kPa respectively, calculate the flow rate of water.
5. Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s .Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE
6. A pipe 300 m long has a slope 1 in 100 and tapers from 1 m diameter at the high end to 0.5 at the low end. Quantity of water flowing is 5400 liters per minute. If the pressure at the high end is 70 kPa, find the pressure at the low end.
7. Water flows through a horizontal pipeline of varying cross-section. If the pressure of water equals 6cm of mercury at a point where the velocity of flow is 30cm/s, what is the pressure at another point where the velocity of flow is 50cm/s?