※ 考生請注意：本試題可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Short answer questions (1) What is the difference between lagrangian and Eulerian approach?? (8%) (2) Show the pressure distribution in the atmosphere.? (6%) (3) What is a Pitot-static Tube? (6%)

2. Air at 105 kPa and 37°C flows upward Air at 105 kPa and 37°C flows upward through a 6-cm-diameter inclined duct at a rate of 65 L/s. The duct diameter is then reduced to 4 cm through a reducer. The pressure change across the reducer is measured by a water manometer. The elevation difference between the two points on the pipe where the two arms of the manometer are attached is 0.20 m. Determine the differential height between the fluid levels of the two arms of the manometer. (density of water, ρ = 1000 kg/m^3, gas constant of air is R = 0.287 kPa·m^3/kg·K.) (20%)
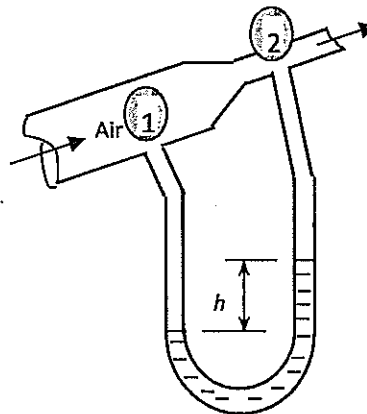

3. (20%)Consider a centrifugal blower that has a radius of 20 cm and a blade width of 7.5 cm at the impeller inlet, and a radius of 40 cm and a blade width of 4.5 cm at the outlet. The blower delivers air at a rate of 0.7 m^3/s at a rotational speed of 700 rpm. Assuming the air to enter the impeller in the radial direction

and to exit at an angle of 50° from the radial direction, determine the minimum

power consumption of the blower. Take the density of air to be 1.25 kg/m³.
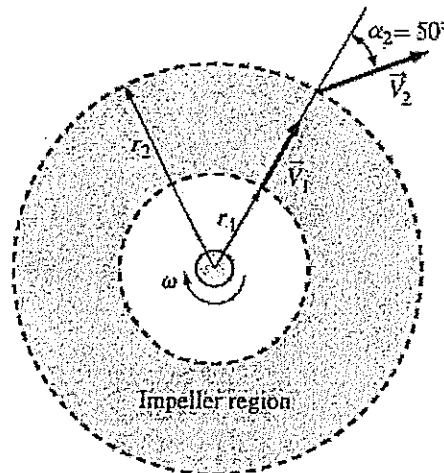
4. (20%)The velocity profile in fully developed laminar flow in a circular pipe of

inner radius R = 2 cm, in m/s, is given by $u(r) = 4(1 - r^2/R^2)$. Determine the

average and maximum velocities in the pipe and the volume flow rate.
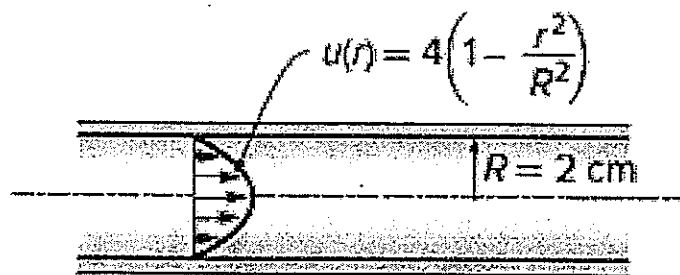
5. (20%) If stream function for steady flow is given by $\psi = y^2 - x^2$, determine

whether the flow is rotational or irrotational. Find the potential function, if the

flow is irrotational and vorticity, if it is rotational.