國立中興大學

108 學年度

碩士班考試入學招生

試　　題

學系：土木工程學系乙組

科目名稱：流體力學

1. Use **M** (Mass), **L** (Length) and **t** (time) to represent the following physical quantities. For example, the answer for "**velocity**" is [**Lt⁻¹**]. (Note: *You must explain **how** the results are obtained to get full credits.* (10%)

   (1) Vapor pressure (5%)

   (2) Absolute viscosity (5%)

2. Explain the following terms physically and/or mathematically. (40%)

   (1) Bernoulli's equation (in terms of <u>pressures</u>) (8%)

   (2) <u>Reynolds number</u> and <u>Froude number</u> (8%)

   (3) <u>Incompressible flows</u> and <u>Potential flows</u> (8%)

   (4) <u>Path line</u> and <u>Streamline</u> (8%)

   (5) <u>Two-dimensional flows</u> and <u>Steady flows</u> (8%)

3. Water at 15°C is siphoned from a large tank through a constant diameter hose as shown in **Fig. P3**. Determine the maximum height of the hill, H, over which the water can be siphoned without cavitation occurring. The end of the siphon is 1.5 m below the bottom of the tank. Atmospheric pressure is 101.3 kPa (absolute), and the vapor pressure of at 15°C is 1.765 kPa (absolute). (20%)
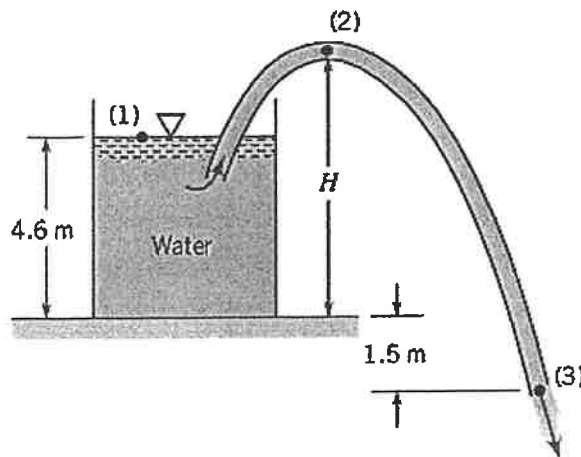

Fig. P3

4. A certain spillway for a dam is 64 m wide and is designed to carry 640 m³/s at flood stage. A physical model with 1 m width is constructed to study the flow characteristics through the spillway. (30%)

   (1) Determine the required model flowrate to ensure the dynamic similarity? (10%)

   (2) The total force on part of the model is found to be 48 N. Determine the force on the prototype. (10%)

   (3) What operating time for the model corresponds to a 24-hr period in the prototype? (10%)