

明新科技大學 98 學年度研究所招生考試 試題卷

系所名稱	類別	科目	節次	准考證號碼 (考生請填入)	考試日期
化學工程與材料科技研究所 (甲組)	碩士班	輸送現象與單元操作	第一節		98/5/3

※答案須寫在答案卷內，否則不予計分。

1. A liquid is flowing through a horizontal straight pipe at 2.5 m/s. The inside diameter of the pipe is 2.067in. The viscosity of the liquid is 1.2 cp and the density is 897 kg/m³. Determine the Reynolds number and the type in this flow? (20%)
2. An incompressible liquid flows steadily through a conduit of circular cross-section and increasing diameter. At location 1, the diameter is 2.5 cm and the velocity is 5 m/s; at location 2, the diameter is 5 cm. What is the velocity at location 2? What is the change of the kinetic energy (J/kg) of the fluid between locations 1 and 2? (20%)
3. 使用一篩板式蒸餾塔進行苯-甲苯混合物分離，進料速率 318 kgmol/h 含 45 mol% 苯及 55 mol% 甲苯且溫度恰為泡點，蒸餾過程為連續式，塔內壓力約常壓，若塔頂與塔底產物分別含 92 mol% 苯與 95 mol% 甲苯，請問如何設計此一蒸餾塔? (20%)
4. 外徑 5 cm 的蒸汽管以 6.0 cm 厚之保溫材料($k = 0.05 \text{ W/m-K}$)保溫，如保溫材料之內外側溫度分別為 120°C 與 40°C，則 25 m 管長的熱損失速率為多少 kW? (20%)
5. A storage vessel is well stirred and contains 500 kg of total solution with a concentration of 5.0% salt. A constant flow rate of 900 kg/h of salt solution containing 16.67% salt is suddenly introduced into the tank and a constant withdrawal rate of 600 kg/h is also started. These two flows remain constant thereafter. Derive an equation relating the outlet withdrawal concentration as a function of time. Also, calculate the concentration after 2.0 hours of salt solution withdrawal? (20%)