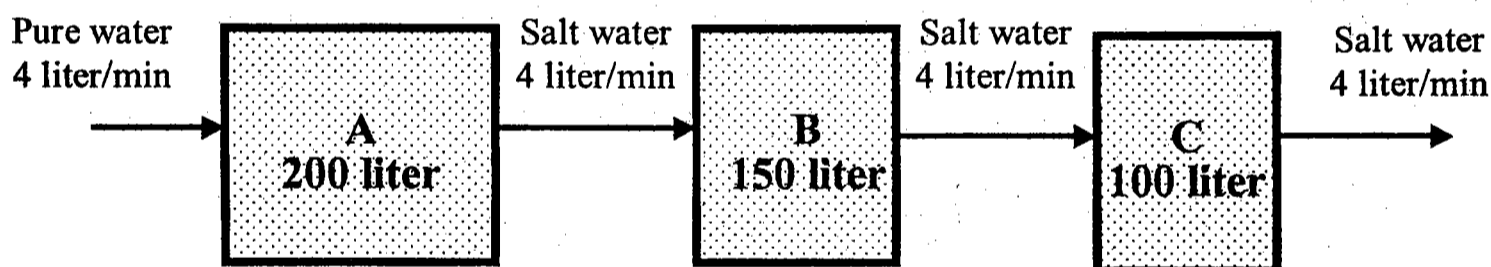


大葉大學 九十二 學年度 研究所碩士班 招生考試試題紙

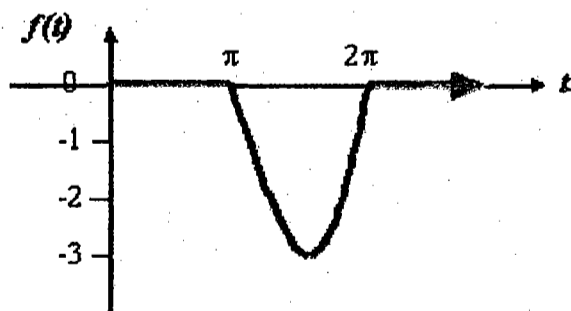
系 所 別	組 別	考 試 科 目 (中文名稱)	考 試 日 期	節 次	備 註
環境工程系碩士班	甲	工程數學	4月13日	第一節 08:30 ~ 10:00	共二頁

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）
(請詳列計算步驟，否則不與計分)

1. Solve the 1st order ODE $y'+2y=e^{-2x}/x^2$ with initial condition of $y(1)=0$? 【15%】
2. Solve the ODE $2x^2y''+6xy'+2y=0$ for general solution? 【15%】
[Hint: Euler-Cauchy Equation]
3. Three tanks of different size are connected by a pipeline as shown in figure below. Initially, three cups of salt with 10g, 40g and 70g amounts are put into A, B and C tank separately to mix well with water. Starting the system to mix the three tanks by flow rate shown in figure and measuring the amount of salt in three tanks with times. Try to formulate the system of ODEs and solve them by Laplace Transform? 【20%】
[Hint : Set $y_1(t)$ 、 $y_2(t)$ 、 $y_3(t)$ as the amount of salt in A,B,C tank. By using the continuity equation as $dy/dt = (\text{inflow rate of salt}) - (\text{outflow rate of salt})$, then you can formulate the system of 1st order ODEs]



4. Try to find the Laplace transform of $f(t)$, i.e. $\mathcal{L}\{f(t)\}$, as shown in figure below? where $f(t)=3\text{sint}$ ($\pi < t < 2\pi$) & $f(t)=0$ (otherwise) 【15%】



5. Find the series solution $y=\sum a_m x^m$ of ODE $y''-3y'+2y=0$ expressed through x^4 term with initial conditions of $y(0)=1$ & $y'(0)=2$? 【20%】
6. Solve the non-homogeneous ODE $y''+4y'+4y=5e^{-2x}$ for general solution and particular solution? 【15%】