國立臺北科技大學九十五學年度碩士班招生考試

系所組別：3210 環境規劃與管理研究所甲組

第二節 工程數學 試題

填 准 考 證 號 碼

注意事項：

1. 本試題共 5 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

(1) Please solve the kinetic equations for the three species (C_a, C_b, C_c) for the consecutive equation $C_a \xrightarrow{k_1} C_b \xrightarrow{k_2} C_c$ (an example of consecutive equation is $NH_3 \longrightarrow NO_2^- \longrightarrow NO_3^-$), where k_1 and k_2 are first order rate constants. At t=0, $C_a = C_a^0$, $C_b = C_b^0$, $C_c = C_c^0$. Since the reactions follow first order; therefore, $-\frac{dC_a}{dt} = k_1 C_a$, $\frac{dC_b}{dt} = k_1 C_a - k_2 C_b$, $\frac{dC_c}{dt} = k_2 C_b$ (30%)

(2) Solve $(e^x+3y^2)dx+2xydy=0$ (15%)

(3) Find a complete solution of the equation for $y''-2y'+y=e^x+x$ (20%)

(4) What is the Fourier expansion of the periodic function whose definition in one period is $f(t)=2+t^2$, $-4 \le t \le 4$ (15%)

(5) What are the Fourier sine and cosine expansions of the periodic function whose definition in one period is $f(t)=t^2$, $0 \le t \le 3$ (20%)