

大葉大學九十四學年度碩士班甄試試題紙

所 別	組別	考試科目 (中文名稱)	考試日期	考試時間	備註
電機工程研究所		工程數學	12月13日	9:00 ~ 10:30	共乙頁

註：備註欄若未註明可攜帶計算機或其他輔助工具作答時，考生一律不准攜帶。

Part I. Ordinary Differential Equations

Solve the following differential equations, please write down all the steps in details. (40%)

(1). $y' = \frac{x(1-y^2)}{1+x^2}$

(2). $y' = 3x^2 - \frac{y}{x}$

(3). $e^x \sin y - 2x + (e^x \cos y + 1)y' = 0$

(4). $xy' = \frac{y^2}{x} + y$

(5). $x^2y'' + 3xy' + 10y = 0$

(6). $y'' - 6y' + 9y = 5e^{3x}$

Part II. Laplace Transform

Solve the following initial value problems by Laplace transform, please write down all the steps in details. (20%)

(7). $y'' + y = t; \quad y(0) = 1, \quad y'(0) = 0$

(8). $y'' + 4y = f(t); \quad y(0) = y'(0) = 0$

in which $f(t) = \begin{cases} 0 & \text{for } t < 3 \\ t & \text{for } t \geq 3 \end{cases}$

Part III. Fourier Transform

(9). Let K be a positive number and let $f(t) = \begin{cases} 1 & \text{for } 0 \leq t \leq K \\ 0 & \text{for } t > K \end{cases}$

Find the Fourier sine and Fourier cosine transform of the above function. (20%)

Part IV. Complex Integration

(10). Evaluate the complex integration, (20%)

$\oint_C (z + \bar{z} + \frac{1}{z} + z\bar{z} + x + y) dz$, where $z = x + iy$, The closed path defined by $C: |z| = 1$