

大葉大學 97 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
電機工程系	乙	工程數學	4月13日	第一節	共2頁 08:30~10:00

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)

一、Solve the following first order differential equations (where $y' = \frac{dy}{dx}$)。 (26%)

(a.) $yy' = \sin^2 x$, $y(0) = \sqrt{3}$

(b.) $xy' = x + y$, $y(1) = -7.4$

二、Solve the following second order differential equations(where $y' = \frac{dy}{dx}$, $y'' = \frac{d^2y}{dx^2}$)。(26%)

(a.) $y'' + y = 2e^x$, $y(0) = 1.75$, $y'(0) = 1$

(b.) $y'' + y' + 4y = -10\sin 2x$, $y(0) = 5$, $y'(0) = 0.5$

三、Given $f(t)$, find the laplace transformation $F(s)$. (17%)

(a.) $f(t) = te^{-5t}$

(b.) $f(t) = t \cos t$

(c.) $f(t) = \begin{cases} 1-t, & 0 \leq t \leq 1 \\ 0, & t > 1 \end{cases}$

(d.) $f(t) = t, 0 \leq t \leq 1$

四、Given $F(s)$, find the inverse laplace transformation $f(t)$ 。 (16%)

(a.) $F(s) = \frac{1}{s^4 - 2s^3}$

(b.) $F(s) = \frac{3}{(s+1)^2}$

(c.) $F(s) = \frac{0.3}{s^2 + 2s + 2}$

(d.) $F(s) = \frac{8}{\left(s - \frac{1}{2}\right)^3}$

五、Find the eigenvalues and eigenvectors of the following matrix A 。 (15%)

(a.) $A = \begin{bmatrix} 6 & 10 & 6 \\ 0 & 8 & 12 \\ 0 & 0 & 2 \end{bmatrix}$

(b.) $A = \begin{bmatrix} 3 & 4 \\ 4 & -3 \end{bmatrix}$