

大葉大學九十三年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
電機工程學系		工程數學	12月8日	9:00~10:30	共二頁

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。

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

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

(b). $y' - x^3 y = -4x^3$, $y(0) = 6$

(2) . Solve the following Second order differential equations (where $y' = \frac{dy}{dt}$, $y'' = \frac{d^2y}{dt^2}$). (26%)

(a). $y'' + 2y' + 2y = \cos t$, $y(0) = 1.2$, $y'(0) = 1.4$

(b). $ty'' - y' = (3+t)t^2 e^t$, $y(-1) = 2 + e^{-1}$, $y'(-1) = -2 - e^{-1}$

(3) . Find the following complex integration. (30%)

(a). $\int_c \frac{6z^2 - 4z + 1}{(z-2)(1+4z^2)} dz$, $c: |z| = 1$

(b). $\int_0^{2\pi} \frac{\cos \theta}{17 - 8 \cos \theta} d\theta$

(c). $\int_{-\infty}^{\infty} \frac{x}{(4+x^2)^2} dx$

(4) . Consider the saw tooth function.

$$F(x) = \begin{cases} x+1, & -1 \leq x \leq 0 \\ -x+1, & 0 \leq x \leq 1 \end{cases}, f(x+2) = f(x) \quad \text{Find its Fourier series. (18\%)}$$