國立彰化師範大學 99 學年度碩士班招生考試試題

系所：工業教育與技術學系　　組別：乙組　　科目：工程數學

☆☆請在答案紙上作答☆☆　　

共佔 100 分每題配分置於題目前面

(一) (8 分) To solve $y' = \dfrac{xy^2}{x^2+4}$

(二) (8 分) To solve $ydx + \left(x^2y^3 + x\right)dy = 0$

(三) (8 分) To solve $y'' + 7y' + 12y = e^{-3x}$

(四) (12 分) use the Laplace Transform method to solve

$y'' + 6y' + 9y = e^{-3t}$, $y(0) = y'(0) = 0$

(五) (14 分) To find

(1) $\mathrm{L}\left[t^2 \sin 2t\right]$

(2) $\mathrm{L}^{-1}\left[\dfrac{S^2+2S-4}{S^3-5S^2+2S+8}\right]$

(六) (10 分) Evaluate (Show details)

(1) $\int_0^{2\pi} \dfrac{1}{2-\cos\theta} d\theta$

(2) $\int_{-\infty}^{\infty} \dfrac{\sin 3x}{x^2+9} dx$

(七) (10 分) Given A=$\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$，Find sin(A)?

(八) (20 分) Is the following function even or odd? Find its Fourier series of the function

$$f(x) = \begin{cases} k & \dfrac{-\pi}{2} < x < \dfrac{\pi}{2} \\ 0 & \dfrac{\pi}{2} < x < \dfrac{3\pi}{2} \end{cases}$$ and show that $1 - \dfrac{1}{3} + \dfrac{1}{5} - \dfrac{1}{7} + \ldots\ldots = \dfrac{\pi}{4}$

(九) (10 分) Solve

$\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$

$u(0, \quad y) = 0$, $u(a, \quad y)_x = G(y)$, $u(x, \quad 0) = 0$, $u(x, \quad b)_y = g(x)$ where a and b are constants.