國立彰化師範大學103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__

共 100%每題配分置於題目後面

1. Find the particular solution of the following differential equation. (15%)

$$y''-3y'-4y=0, \quad y(0)=2, \, y'(0)=1.$$

2. Using the Laplace transform to solve the initial value problem. (15%)

$$y''+9y=10e^{-t}, \quad y(0)=0, \, y'(0)=0.$$

3. Find the Laplace transform of $f(t)e^{-3t}$, where $f(t) \equiv \begin{cases} 0 & ; \, t<8 \\ t^2-4 & ; \, t\geq 8 \end{cases}$ (10%)

4. If $A=\begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$, $B=\begin{bmatrix} 1 & 4 \\ -2 & 3 \end{bmatrix}$ find A^{-1} and $(A+B)^T$. (10%)

5. Find the Fourier series of the following periodic function of period T=2. (15%)

$$f(t)=t, \quad -1<t<1.$$

6. Find the Eigen-values and Eigen-vector of the following matrix A. (15%)

$$A=\begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$

7. Find the directional derivative of $f(x,y,z)=2x^2-y^2+z^2$ at $(1,2,3)$ in the direction from $(1,2,3)$ to $(3,5,0)$. (10%)

8. Find the inverse Laplace transform of the following function. (10%)

$$F(s)=\frac{-s+11}{s^2-2s-3}$$