國立彰化師範大學 101 學年度碩士班招生考試試題

系所：車輛科技研究所　　科目：工程數學

☆ ☆請在答案卷上作答☆☆　　

1. Find the determine, eigenvalues, and eigenvectors of A where

$$A=\begin{bmatrix} 0 & -1 & 0 \\ 2 & 3 & 0 \\ -1 & -1 & 1 \end{bmatrix}.$$ (15%)

2. Find the gradient of the function $f(x,y,z)=x^2+y^2+z^2-1$. (15%)

3. A series $a_0=2$, $a_1=-2$, $a_2=10$, $a_3=-26$,……., $a_n=-2a_{n-1}+3a_{n-2}$, ……. Find the solutions of a_9 and a_k. (20%)

4. Find the Laplace transforms of functions $\sin bt$ and $e^{at}\sin bt$ as zero initial conditions, respectively. (20%)

5. Solve the following ordinary differential equation.

$\frac{d^2y}{dx^2}+4y=0$, as $y(0)=3$ and $\frac{dy(0)}{dx}=0$. (15%)

6. There are two lines, L_1 and L_2, where

$L_1:\ \frac{x-1}{1}=\frac{y-1}{1}=\frac{z-1}{1}$ and $L_2:\ \frac{x-2}{-1}=\frac{y-3}{1}=\frac{z-1}{2}$.

Find the shortest distance between these two lines. (15%)