# 國立臺北科技大學九十四學年度學士班轉學考試

## 車輛系　工程數學試題

填 准 考 證 號 碼



| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**注意事項：**

1. 本試題共 6 題，共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。

1. Solve $y''+3y'+2y=f(x), y(0)=y'(0)=0$ for each $f(x)$.

(a)(15%) $f(x)=e^{-x}$

(b)(15%) $f(x)=\begin{cases}1, & 0\le x<1\\ 0, & 1<x\end{cases}$

2. (20%) An RC series circuit has a resistor R=1kΩ, a capacitor C=1mF, and a voltage source E(t)=12V. Assume that the voltage of the capacitor at time t=0 is zero. Find the current expressed by time t.

3. (10%) Solve $\begin{cases}x+y+z=3\\ y+2z=3\\ x-z=0\end{cases}$

4. A curve is described as x(t)=cos(t), y(t)=sin(t), z(t)=t, $0\le t\le 1$

(a) (5%) Find the tangent vector to the curve at t=$\pi/4$

(b) (5%) Find the normal vector to the curve at t=$\pi/4$

5. (10%) Find the cosine of the angle between two lines 2x+3y =6 and x =4

6. (20%) Prove that $|A|=\pm 1$ and $\lambda\bar{\lambda}=1$ if $A^TA=I$, $\bar{A}=A$, and $\lambda$ is an eigenvalue of $A$ where $|A|$ is the determinant of $A$, $\bar{\lambda}$ the conjugate of $\lambda$, $\bar{A}$ the conjugate of $A$, and $I$ an identity matrix.