# 國立臺北科技大學 105 學年度碩士班招生考試

## 系所組別：1411、1412、1413、1421、1422
## 能源與冷凍空調工程系碩士班甲、乙組

## 第二節　工程數學　試題



**注意事項：**

1. 本試題共五題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. (20%) Please find the general solutions of the following equations.

(a) (10%) $(x^3 + 3xy^2)dx + (3x^2y + y^3)dy = 0$

(b) (10%) $(4x + 3y^2)dx + 2xydy = 0$

2. (20%) Please solve the following equation by the method of Laplace transform.

$$y'' - 3y' + 2y = 4t\ ,\ y(0) = 1\ ,y'(0) = -1$$

3. (15%) Please solve the following equation by the method of Laplace transform.

$$y'' + y' = 1 + \delta(t-2)\ ,\ y(0) = 0\ ,y'(0) = 3$$

Hint: $\delta(t)$ *is Delta function,* (i)if $t \neq 0\ ,\delta(t) = 0$ $(ii)\int_{-\infty}^{\infty}\delta(t)dt = 1$

4. (15%) Please solve the following equation by the Frobenius method.

$$4xy'' + 2y + y = 0$$

5. (30%) Please solve the following equations by the method of undetermined coefficients.

(a)(15%) $y'' - 6y' + 9y = 2e^{3x} + 9x + 3$

(b)(15%) $y''' + 3y'' + 3y' + y = 30e^{-x}$