

## 國立臺北科技大學 106 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

## 第一節 工程數學 試題

第一頁 共一頁

**注意事項：**

1. 本試題共五題，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)  $y'' + 4y = 8x^2$  (10%)

(b)  $x^2y'' - 2.5xy' - 2y = 0$  (10%)

2. (20%) Please solve the following equation by the variation of parameter method.

$$y''' - \frac{3}{x}y'' + \frac{6}{x^2}y' - \frac{6}{x^3}y = x \ln x$$

3. (20%) Please solve the following equation by the Frobenius method.

$$4x^2y'' + (4x + 1)y = 0$$

4. (20%) Please solve the following equation by the method of Laplace transform.

$$ty'' - ty' + y = 0, \quad y(0) = 0, \quad y'(0) = 1$$

5. (20%) Please find the Laplace transform of the following functions.

(a)  $f(t) = \begin{cases} 0, & \text{if } 0 \leq t < 4 \\ e^{-3t}, & \text{if } 4 \leq t < 6 \\ 1 + t, & \text{if } t \geq 6 \end{cases}$  (10%)

(b)  $f(t) = \int_0^t e^{-4z} \sin 3z \, dz$  (10%)