

## 國立臺北科技大學 112 學年度碩士班招生考試

系所組別：1410、1420

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 1 頁 共 1 頁

**注意事項：**

1. 本試題共六題，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
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. (15%) Solve the following ordinary differential equation.

$$xy' = \frac{y^2}{x} + y$$

2. (15%) Solve the following ordinary differential equation.

$$x^2y'' - 5xy' + 10y = 0; y(1) = 4, y'(1) = -6$$

3. (20%) Solve the following ordinary differential equation by the method of undetermined coefficients.

$$y'' + 2y' - 3y = 4x^2 - x + 11e^{2x}$$

4. (15%) Solve the following initial value problem by Laplace transform

$$y'' + 4y' + 3y = e^t; y(0) = 0, y'(0) = 2$$

5. (15%) Determine the inverse Laplace transform

$$L^{-1} \left[ \frac{4}{s^2 + 4s + 20} \right]$$

6. (20%) Solve the initial value problem by Laplace transform

$$y'' + 4y = f(t); y(0) = y'(0) = 0$$

$$f(t) = \begin{cases} 0, & \text{for } t < 3 \\ t, & \text{for } t \geq 3 \end{cases}$$