國立臺北科技大學 110 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

注意事項：

1. 本試題共 6 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. Solve the following differential equation.　(15%)

$$y' = \frac{1}{x}y^2 + \frac{1}{x}y - \frac{2}{x}$$

2. Find the solution by the method of undetermined coefficients.　(15%)

$$y'' + y' + 3y = 5\sin(2x)$$

3. Find the solution by a power series method.　(20%)

$$x^2 y'' + 5xy' + (x+4)y = 0$$

4. Determine the Laplace transform of　(15%)

$$g(t) = \left\{ \begin{array}{ll} 0 & for \ t < 2 \\ t^2 + 1 & for \ t \geq 2 \end{array} \right\}$$

5. Solve the following integral equation by Laplace transform.　(15%)

$$f(t) = 2t^2 + \int_0^t f(t-\tau)e^{-\tau}d\tau$$

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

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

Note that $\delta(t-3)$ *is Dirac delta function.*