107RA01

國立臺北科技大學107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5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. (15%) Solve the following ordinary differential equation.

$$y'' + 2y' + y = e^{-x}\ ,\quad y(0) = -1\ ,\quad y'(0) = 1$$

2. (15%) Solve the following ordinary differential equation by variation of parameters.

$$y'' - 3y' + 2y = -\frac{e^{3x}}{e^{x}+1}$$

3. (20%) Solve the following ordinary differential equation by Frobenius method.

$$xy'' + y' + y = 0$$

4. (20%) Find the inverse Laplace transform of the following Laplace functions.

(a) (10%) $F(s) = \frac{1}{S^2+4S+5}$

(b) (10%) $F(s) = \frac{S^4+3(S+1)^3}{S^4(S+1)^3}$

5. (30%) Solve the following ordinary differential equations by the Laplace transform.

(a) (15%) $y'' + 9y = \cos 2x\ ,\quad y(0) = 1\ ,\quad y(\frac{\pi}{2}) = -1$

(b) (15%) $y'' + 5y' + 6y = \delta(t)\ ,\quad y(0) = 3\ ,\quad y'(0) = 0$