115MT01

國立臺北科技大學115學年度碩士班招生考試

系所組別：1201 製造科技研究所

第一節　微分方程　試題（選考）

注意事項：

1. 本試題共5題，每題20分，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. (20 points) Solve the following differential equation using the method of exact equations:

$$(2x + e^y)dx + (xe^y - 1)dy = 0$$

2. (20 points) Solve the following initial value problem by separation of variables:

$$y' = 2xe^{-y}, \quad y(0) = 0$$

3. (20 points) Find the general solution of the following differential equation:

$$y'' + y = \sec x$$

4. (20 points) Solve the following initial value problem using Laplace transform:

$$y'' + 2y' + y = 2e^{-t}u(t-2), \quad y(0) = 0, \quad y'(0) = 0$$

where $u(t-a)$ is the unit step function.

5. (20 points) Solve the following system of differential equations subject to $x(0) = 1$ and $y(0) = 0$:

$$\begin{cases} x' = 4x - y \\ y' = 2x + y \end{cases}$$