國立臺灣科技大學101學年度碩士班招生試題

系所組別： 材料科學與工程系碩士班乙組

科　　目： 工程數學

（總分為100分）

總分 100 分，共 5 大題。

1. Use the Laplace transform to solve the following problem:　　　(15%)

   $y'' + 4ty' - 4y = 0$; $y(0) = 0$, $y'(0) = -7$

2. A body of mass m falls from rest in a medium for which the resistance (lb) is proportional to the velocity (ft/sec). If the specific gravity of the medium is one-fourth that of the body and if the terminal velocity is 24 ft/sec, find the distance traveled in 3 sec.　　　(15%)

3. Solve the differential equation:

   $\dfrac{(2x+1)^2}{4} y'' + (2x+1)y' - 6y = 4x^2 + 4x - 1$　　　(15%)

4. For the following differential equation, find the first five terms of each of two linearly independent series solutions.

   $x^2 y'' + 4xy' + (x^2 + 2)y = 0$　　　(20%)

5. Solve the following differential equations.

   (1) $4y'' + 36y = \csc 3x$　　　(15%)

   (2) $y' + y = f(t)$, $y(0) = 5$　　　(20%)

   $f(t) = \begin{cases} 0, & 0 \le t < \pi \\ 3\cos t, & t \ge \pi \end{cases}$