國立臺北科技大學

九十四學年度自動化科技研究所入學考試

工程數學甲組試題

填准考證號碼　　第一頁　共一頁

注意事項：

1. 本試題共【五】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

Problem 1. (20%)

Solve the differential equation $x^2y' + xy + \sqrt{1 - x^2y^2} = 0$

Problem 2. (20%)

Solve the differential equation $y'' - 3y' + 2y = \sin(e^{-x})$

Problem 3. (20%)

Solve the differential equation $\ddot{x} + 16x = f(t)$ with the initial values $x(0) = 0$ and $\dot{x}(0) = 1$, where $f(t) = \begin{cases} \cos(4t) & 0 \le t < \pi \\ 0 & t \ge \pi \end{cases}$

Problem 4. (20%)

Find the eigenvalues and eigenfunctions of differential equation $y'' + \lambda y = 0$, where $-\infty < x < \infty$ and $y(x)$ is bounded.

Problem 5. (20%)

By using the Power Series Method, solve the differential equation $y'' - xy' + y = 0$