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國立臺北科技大學九十六學年度碩士班招生考試

系所組別：1730 電腦與通訊研究所丙組

第一節 工程數學 試題

第一頁 共一頁

注意事項：

1. 本試題共五題，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。

一. Solve the following differential equation

$$x(\ln y - \ln x)dy = (y \ln y - y \ln x - x)dx \quad (20\%)$$

二. Find the general solution of the equation $3y'' - 6y' + 6y = e^x \sec x$ (20%)

三. Find the general solution of the following differential equation.

$$x \frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} = \frac{\ln x^3}{x} \quad (20\%)$$

四. Let $u(x,t) = X(x)T(t)$. Write a solution of the following boundary problem.

$$\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}, \text{ for } 0 < x < L, t > 0$$
$$u(0,t) = u(L,t) = 0 \text{ for } t \geq 0; u(x,0) = 1 \text{ for } 0 \leq x \leq L \quad (20\%)$$

五. Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} + \sin \pi x$, ($0 \leq x \leq 1, t \geq 0$)

$$u(0,t) = 10, \frac{\partial u}{\partial x}(1,t) = 0, u(x,0) = 110. \quad (20\%)$$