國立臺北大學 106 學年度學士班暨進修學士班轉學生招生考試試題

系別：電機工程學系 3 年級(學士班)　　考試時間：80 分鐘

科目：工程數學　　第 1 頁，共 1 頁

□可 ☑不可使用計算機

1.Find the particular solution of the following differential equation: (10%)

$\frac{dy}{dx} - xy = 2x, \qquad y(0) = 2$

2.Find the general solution of the following differential equation: (10%)

$\frac{dy}{dx} = (x + y + 1)^2$

3.Solve (10%)

$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 4x^2$

4.Find the general solution $y(x)$ of the following differential equation (10%)

$y'' - (y')^2 = 0$

5.Find the Fourier series of the saw tooth wave function

$f(x) = x + \pi$, if $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$ (10%)

6.Find the Fourier transform of

$$f(x) = \begin{cases} a, & |x| \le a \\ 0, & |x| > a \end{cases}$$

where a>0 and is a constant. (10%)

7.Find the inverse Laplace transform for (10%)

$F(s) = \ln(1 + \frac{1}{s^2})$

8.Solve the initial value problem using Laplace transform technique (10%)

$\frac{d^2y}{dt^2} - 3\frac{dy}{dt} + 2y = 4t + e^{3t}, \qquad y(0) = 1, \qquad \frac{dy(0)}{dt} = -1$

9.If the vectors $\vec{v}(t) = 4t\vec{\imath} + 5t^3\vec{k}$ and $\vec{w}(t) = t^2\vec{\imath} - 5t\vec{\jmath} + 2t^3\vec{k}$. Find

$\frac{d}{dt}(\vec{w} \cdot \vec{v})$ (10%)

and

$\frac{d}{dt}(\vec{v} \times \vec{w})$ (10%)

※試題隨卷繳交