國立暨南國際大學 108 學年度轉學生入學考試試題

第 1 節

科目：工程數學(微分方程)　適用：應光系三

編號：751

考生注意：
1.依次序作答，只要標明題號，不必抄題。
2.答案必須寫在答案卷上，否則不予計分。
3.限用藍、黑色筆作答；試題須隨卷繳回。

本試題 共　頁 第　頁

1. (15%) Solve the given differential equation by finding an appropriate integrating factor.

$(10\text{-}6y+e^{-3x})dx-2dy=0$

2. (15%) Solve the given differential equation by variation of parameters.

$y''+2y'+y=e^{-t}\ln t$

3. (20%) Use the Laplace transform to solve the given system of differential equations.

$\frac{d^2x}{dt^2}+x-y=0$

$\frac{d^2y}{dt^2}+y-x=0$

$x(0)=0$

$x'(0)=-2$

$y(0)=0$

$y'(0)=1$

4. (30%) Expand $f(x)=x^2, 0<x<L$,

(a) in a cosine series (10%)

(b) in a sine series (10%)

(c) in a Fourier series. (10%)

5. (20%) Consider a thin rod of length L with an initial temperature $f(x)$ throughout and whose ends are held at temperature zero for all time $t>0$. Find the temperature $u(x,t)$.

$k\frac{\partial^2u}{\partial x^2}=\frac{\partial u}{\partial t}, \quad 0<x<L, \ t>0$

$u(0,t)=0, \quad u(L,t)=0, \quad t>0$

$u(x,0)=f(x), \quad 0<x<L.$