國立成功大學

114學年度碩士班招生考試試題

編　號：47

系　所：地球科學系

科　目：應用數學

日　期：0211

節　次：第 4 節

注　意：1.不可使用計算機
2.請於答案卷(卡)作答，於試題上作答，不予計分。

1. Please find the general solution of the following ordinary differential equation of exponential decay. (10 %)

$$\frac{dN}{dt} = -kN, \qquad N(0) = 5$$

2. The ordinary differential equation of a free oscillation spring system with weight of m and spring constant k has the following form: (30%)

$$my'' + cy' + ky = 0$$

Where c is the resistance and y is the direction of oscillation. Find the general solution of the equation of motion for (a) c = 0 and (b) $c \neq 0$ and

3. A forced oscillation system of a spring: (30%)

$$my'' + cy' + ky = Focos\omega t$$

Please find the general solution and describe under what circumstances a resonance would occur.

4. Find the Fourier series of the following equation. (15%)

$F(x) = -m \;\; if -\pi < x < 0, F(x) = m \; if \; 0 < x < \pi \;\; F(x+2\pi) = F(x)$

5. Find the Fourier transform of the following equation. (15%)

$$f(x) = 1 \; if -1 < x < 1 and \; f(x) = 0 \; otherwise$$