

國立成功大學

111學年度碩士班招生考試試題

編 號：50

系 所：地球科學系

科 目：應用數學

日 期：0220

節 次：第 4 節

備 註：不可使用計算機

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※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Describe the Divergence Theorem of Gauss and Stoke Theorem,

(a) from  $\iiint_V (\nabla \cdot F) dV$  (10%)

(b) from  $\iint_S (\nabla \times F) \cdot d\bar{a}$  (10%)

2. Find the Fourier Transform of the following equation. (20%)

$$f(t) = \begin{cases} k & -a \leq t \leq a \\ 0 & t < -a \text{ \& } t > a \end{cases}$$

3. Find the solutions of the following ordinary differential equation and the related physical meanings. (20%)

$$\frac{d^2 x}{dt^2} + \omega^2 x = A_0 e^{i\omega_0 t}$$

4. Find eigen value and corresponding eigenvectors of the following matrices. (15%)

$$\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

5. Please describe the system of forced Resistance-Inductance-Capacitance (RLC) circuit and the electric current  $I(t)$  (15%).

$$LI' + RI + \frac{1}{C} \int I dt = E_0 \sin \omega t$$

6. Solve the following ODE. (10%)

$$x^2 y'' + 4xy' - 4y = 0$$