

國立成功大學

112學年度碩士班招生考試試題

編 號：107

系 所：水利及海洋工程學系

科 目：工程數學

日 期：0207

節 次：第 2 節

備 註：不可使用計算機

※ 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. Find a general solution, and show each step of your calculation in detail. (20 pts)

$$y''(x) + 4\pi y'(x) + 4\pi^2 y(x) = 0$$

2. Solve the initial value problem, and show each step of your calculation in detail. (20 pts)

$$y'' - 2y' = 6e^{2x} - 4e^{-2x}, y(0) = -1, \quad y'(0) = 6$$

3. Find the eigenvalues, and the corresponding eigenvectors. Show each step of your calculation in detail. (20 pts)

$$\begin{bmatrix} 3 & 5 & 3 \\ 0 & 4 & 6 \\ 0 & 0 & 1 \end{bmatrix}$$

4. Solve by the Laplace transform, and show each step of your calculation in detail. (20 pts)

$$y'' + 5y' + 6y = u(t-1) + \delta(t-2), \quad y(0) = 0, \quad y'(0) = 1$$

5. Solve $y(t)$ by the Laplace transform, and show each step of your calculation in detail. (20 pts)

$$\begin{cases} y'(t) + z'(t) + z(t) = 0 \\ y'(t) + 2y(t) + 6\int_0^t z(t)dt = -2u(t) \\ y(0) = -5, \quad z(0) = 6 \end{cases}$$