

# 淡江大學 107 學年度碩士班招生考試試題

系別：機械與機電工程學系

科目：工程數學

12-1

考試日期：3月11日(星期日) 第1節

本試題共 六 大題， 一 頁

1. (16%) Solve  $y' = 3x^2 - \frac{y}{x}$ ;  $y(1) = 5$ .

2. (16%) Solve  $x^2 y'' - 3xy' + 4y = 0$ ,  $y(1) = 4$ ,  $y'(1) = 5$ .

3. (16%) Use the method of Laplace transforms to solve

$$y'' + 2y' + 2y = \delta(t - 3), \quad y(0) = y'(0) = 0.$$

4. (16%) Solve

$$\begin{Bmatrix} x_1' \\ x_2' \end{Bmatrix} = \begin{bmatrix} 3 & -4 \\ 2 & -3 \end{bmatrix} \begin{Bmatrix} x_1 \\ x_2 \end{Bmatrix}, \quad \begin{Bmatrix} x_1(0) \\ x_2(0) \end{Bmatrix} = \begin{pmatrix} 7 \\ 5 \end{pmatrix}.$$

5. (16%) Evaluate surface integral  $\iint_S z dS$  where  $S$  is the part of the cone

$$z = \sqrt{x^2 + y^2} \quad \text{between the planes } z = 2 \text{ and } z = 4.$$

6. (20%) Solve  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ ,  $0 \leq x \leq 8$ ,  $0 \leq y \leq 4$

$$\text{B.C.: } u(0, y) = 0, \quad 0 \leq y \leq 4$$

$$u(8, y) = 2, \quad 0 \leq y \leq 4$$

$$u(x, 0) = 0, \quad 0 \leq x \leq 8$$

$$u(x, 4) = 0, \quad 0 \leq x \leq 8$$