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# 淡江大學 106 學年度日間部轉學生招生考試試題

系別：水環系水資源工程組、機電系、  
電機系三年級

科目：工程數學

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考試日期：7月21日(星期五) 第2節

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1. Solve  $\frac{xy}{y-1} - y' = 0$  ;  $y(4) = 1$ . (10%)

2. Solve  $y'' + 9y = 0$ ;  $y(\frac{\pi}{3}) = 1$ ,  $y'(\frac{\pi}{3}) = -3$ . (10%)

3. Solve  $x^2 y'' - 6y = 0$  ,  $y(1) = 5$ ,  $y'(1) = 5$ . (10%)

4. Solve  $y'' + 4y' + 3y = e^t$ ,  $y(0) = 0$ ,  $y'(0) = 1$  by Laplace transform. (15%)

5. Solve

$$\begin{cases} x'' - 2x' + 3y' + 2y = 4 \\ 2y' - x' + 3y = 0 \end{cases}, \quad x(0) = x'(0) = y(0) = 0 \text{ by Laplace transform. (20\%)}$$

6. Solve

$$|\mathbf{A}| = \begin{vmatrix} 3 & 2 & -3 & 1 \\ -2 & -3 & 1 & 2 \\ 2 & 1 & 4 & -2 \\ -4 & -5 & 3 & 1 \end{vmatrix}. \quad (7\%)$$

7. A force  $\vec{F}(x, y, z) = \vec{i} - y\vec{j} + xyz\vec{k}$  moves an object along the path

$$\begin{cases} x = t \\ y = -t^2 \\ z = t \end{cases}, \quad 0 \leq t \leq 1. \text{ Calculate the work? (8\%)}$$

8. Find the Fourier series of the function

$$f(x) = \begin{cases} 2x, & 0 \leq x \leq 2 \\ 0, & -2 \leq x \leq 0 \end{cases} \quad (20\%)$$