

淡江大學 103 學年度碩士班招生考試試題

36.

系別：機械與機電工程學系

科目：工程數學

考試日期：3月2日(星期日) 第2節

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1. (15%) Solve $y' + y = \sin x$; $y(0) = 1$.

2. (15%) Solve $y'' + 2y' - 3y = 8e^x$, by the method of undetermined coefficients.

3. (20%) Solve $\begin{cases} x' + 4y' - y = 0 \\ x' + 2y = e^{-t} \end{cases}$, $x(0) = y(0) = 0$ by Laplace transform.

4. (15%) Find the eigenvalues and corresponding eigenvectors of A.

$$A = \begin{bmatrix} 3 & 0 & 2 \\ 1 & -1 & 5 \\ 0 & 0 & 1 \end{bmatrix}$$

5. (15%) Find the work done by $\mathbf{F} = -4x\mathbf{i} + y^2\mathbf{j} - yz\mathbf{k}$ and $\mathbf{R} = -t^2\mathbf{i} + t\mathbf{j} - 3t\mathbf{k}$ for $0 \leq t \leq 3$.

6. (20%) P.D.E.: $\frac{\partial u}{\partial t} = 9 \frac{\partial^2 u}{\partial x^2}$, $0 < x < 3$, $t > 0$

B.C.: $\frac{\partial u}{\partial x}(0, t) = \frac{\partial u}{\partial x}(3, t) = 0$, $t > 0$

I.C.: $u(x, 0) = x$, $0 < x < 3$