

系所組別：系統及船舶機電工程學系甲、乙、丙、丁組

考試科目：工程數學

考試日期：0307，節次：3

※ 考生請注意：本試題 可 不可 使用計算機(15%) 1. Find the solution of $y'' - 4y = e^{-2x} - 2x$, $y(0) = 0$, $y'(0) = 0$.(10%) 2. Find the inverse Laplace transform of $\frac{s}{(s^2 + 4)^2}$.(10%) 3. Find the eigenvalues and eigenvectors of $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$.

(10%) 4. Find the volume if the vertices are (1, 1, 1), (5, -7, 3), (7, 4, 8), (10, 7, 4).

(15%) 5. Find the Fourier series of the periodic function $f(x) = x^2$, $-\pi < x < \pi$.

(15%) 6. Solve the following problem by the method of separating variables

$$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0, \quad 0 \leq x \leq a, \quad 0 \leq y \leq b, \quad u(x, 0) = 0, \quad u(x, b) = f(x), \quad u(0, y) = 0,$$

$$u(a, y) = 0.$$

(10%) 7. Find all roots of $(-1)^{1/4}$ in the complex plane.(15%) 8. Evaluate the integral $\int_{-\infty}^{\infty} \frac{\sin 2x}{x^2 + x + 1} dx$.