

國立高雄應用科技大學
九十七學年度碩士班招生考試
機械與精密工程研究所（甲乙丙組）

准考證號碼 （考生必須填寫）

工程數學

試題 共 1 頁，第 1 頁

注意：a. 本試題共 8 題，共 100 分。

b. 作答時不必抄題，但必須書寫計算過程或敘明理由，過程或理由不正確時，該題不予計分。

c. 考生作答前請詳閱答案卷之考生注意事項。

1. Find the solution of the differential equation where the initial value is given. (10%)
 $3y^4 - 1 + 12xy^3 y' = 0, y(1) = 2$
2. Find the general solution of the differential equation. (15%)
 $y'' - y' - 2y = 2x^2 + 5$
3. Use the Laplace transform to solve the following differential equation. (15%)
 $y' - 4y = 1, y(0) = 1$
4. Find the equation of the plane containing the given point and having the given vector as normal vector. (10%)
 $(-1, 1, 2); 3\mathbf{i} - \mathbf{j} + 4\mathbf{k}$
5. Find the eigenvalues of the matrix and the corresponding eigenvectors. (15)
 $\begin{pmatrix} -5 & 0 \\ 1 & 2 \end{pmatrix}$
6. Evaluate $\int_C xy dx - y \sin(x) dy$ if C is given by $x(t) = t^2$ and $y(t) = t$ for $-1 \leq t \leq 4$. (10%)
7. Find the Fourier series of the function on the interval. (15%)
 $f(x) = -x, -1 \leq x \leq 1$
8. Use complex analysis to find the root of $\sqrt[3]{1+i}$. (10%)