

國立高雄應用科技大學
九十七學年度碩士班招生考試
電子工程系（甲組）

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 10 題，每題 10 分，共 100 分。

b. 作答時不必抄題。

c. 考生作答前請詳閱答案卷之考生注意事項。

1. Model a series RLC circuit and find the current in the circuit for the electromotive force $E(t) = E_0 \sin \omega t$.
2. Solve the non-homogeneous differential equation $x^3 y''' - 3x^2 y'' + 6xy' - 6y = x^5 \ln x$.
3. Using the power-series method to solve the differential equation $y'' + \frac{1}{2x} y' + \frac{1}{4x} y = 0$.
4. Using the Laplace transformation to solve the differential equation $y'' + 3y = 5 \sin pt$ with the initial conditions of $y(0)=0$ and $y'(0)=0$.
5. Find the solutions to the differential equations
$$\begin{aligned} y_1'' &= y_1 + 2y_2 \\ y_2'' &= 2y_1 + y_2 \end{aligned}$$
6. Evaluate the integral $\int_C (z^2 y \cos xy dx + z^2 x \cos xy dy + 2z \sin xy dz)$ from point $A(x,y,z): (1, \pi/3, -1)$ to point $B(x,y,z): (2, 2\pi/3, 1)$.
7. Find the Fourier series of $f(y) = e^y$ if $-\pi < y < \pi$ and $f(y+2\pi) = f(y)$.
8. Find the solutions to the partial differential equation $i \frac{\partial f}{\partial t} = -\lambda \frac{\partial^2 f}{\partial x^2}$ with the boundary conditions of $f(t, x=0) = 0$ and $f(t, x=L) = 0$. ($i = \sqrt{-1}$)
9. Using the residue theorem to find the integral $\int_{-\infty}^{\infty} \frac{x^2 - 1}{x^4 + 5x^2 + 4} dx$.
10. Using generating function of the binomial distribution to find its mean and variance.