

國立高雄第一科技大學 101 學年度 碩士班 招生考試 試題紙

系所別：機械與自動化工程系

組別：不分組

考科代碼：1131

考科：工程數學(一)

注意事項：

- 1、本科目得使用本校提供之電子計算器。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. Solve the following differential equations:

(a) Solve $(y^2 - y)dx + xdy = 0, y(1) = \frac{1}{2}$. (5%)

(b) Solve $y' \tan x - 2y = 4, y(\frac{\pi}{2}) = 1$. (5%)

(c) Solve $y''' - 3y'' - y' + 3y = x^2$. (5%)

(d) Find an equation for the curve that pass through the point $(x,y)=(0,1)$ and has the slope $\frac{dy}{dx} = e^{-2x} - 2y$ for any point (x,y) . (5%)

2. Find the Fourier Series of periodic function $f(x) = |x|, -\pi \leq x \leq \pi$. (20%)

3. Find Fourier Transform of $f(x) = \begin{cases} e^{-ax}, & x > 0 \\ 0, & \text{otherwise} \end{cases}, a > 0$. (20%)

4. Using Laplace Transform, find $y(t)$ satisfying the giving equation and conditions.

$y'' + y' - 2y = 7 + t - t^2, y(0) = y'(0) = 0$. (20%)

5. Using Gram-Schmidt Orthogonalization Process, find the orthogonal sets for the functions

$\{1, x, x^2\}$ with respect to the following two different intervals:

(a) The interval $[0,1]$, (10%)

(b) The interval $[-1,1]$. (10%)