

招生學年度	102	招生類別	碩士班
系所班別	材料科學與工程學系碩士班		
科目	工程數學		
注意事項	本考科可使用掌上型計算機		

- (15%) Solve $x'' + 4x = \sin^2 2t$.
- (15%) Solve the initial value problem by Laplace Transform.

$$y'' - y = t, y(0) = 1 \text{ and } y'(0) = 1$$

- (15%) Solve the initial value problem:

$$y'' + 4ty' - 4y = 0, y(0) = 0, y'(0) = -7$$

- (15%) Find the Fourier series of the following function:

$$f(x) = |x|, -\pi \leq x \leq \pi$$

- (15%) Find the inverse Laplace transform of:

$$H(s) = \frac{2s^2 + 3s + 3}{(s + 1)(s + 3)^3}$$

- (15%) Find the inverse matrix B^{-1} which satisfies $BB^{-1} = B^{-1}B = I$, where I is the unitary matrix.

$$B = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}, I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- (10%) Find the eigenvalues and eigenvectors of the following matrix:

$$\begin{bmatrix} 5 & 0 & -15 \\ -3 & -4 & 9 \\ 5 & 0 & -15 \end{bmatrix}$$