

逢甲大學95學年度產業研發碩士專班試題

科目	工程數學	適用 系所	積體電路與通訊產業研發碩士專班	時間	一〇〇分鐘
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※請務必在答案卷作答區內作答。

共1頁第1頁

1. Consider the following differential equation

$$y' + 3y = 5$$

- (1) Determine the homogeneous solution $y_h(x)$ (5%)
- (2) Determine the particular solution $y_p(x)$ (5%)
- (3) If the initial condition $y(0) = 1$ is given, determine the complete solution $y(x)$. (5%)
- (4) Verify your answer in (3) by using Laplace transform. (10%)

2. Show that the following two vectors $\vec{u} = 2\vec{i} + 3\vec{j}$ and $\vec{v} = \vec{i} + 5\vec{j}$ are linearly independent. (10%)

3. If $f(t) = t$ and $g(t) = e^{-2t}$ are given

- (1) Determine $f(t) * g(t)$, where $*$ is the convolution operator. (8%)
- (2) Determine $L\{f(t) * g(t)\} = ?$, where $L\{\}$ is the Laplace transform operator. (7%)

4. $A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$, please find

- (1) the eigenvalues, (5%)
- (2) the eigenvectors of A , (5%)
- (3) $A^4 - A^3 - 4A^2 - A$ (5%)

5. Evaluate $\int_0^{\infty} \frac{\sin x}{x} dx$ and $\int_0^{\infty} \frac{\sin^2 x}{x^2} dx$ (20%)

6. Find the principal value $(1 + i)^{1-i}$. (15%)