

國立虎尾科技大學九十七學年度研究所（碩士班）入學試題

所別：光電與材料科技研究所（甲、乙、丙組）

科目：考試科目 1（工程數學）

注意事項：

- (1) 本試題共有五題，合計一百分。
- (2) 請依序作答在答案卷上並註明題號。

1. Solve the following system by the Gauss elimination. (15%)

$$\begin{cases} 3x + 6y + 9z = 60 \\ 14x + 6y + 2z = 26 \\ 2x + 12y + 4z = 0 \end{cases}$$

2. Find the eigenvalues and the inverse of the matrix A . (25%)

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

3. Using the Laplace transform, solve the following problem. (20%)

$$y'' + 9y = r(t) \quad \text{with} \quad y(0) = 0, \quad y'(0) = 0, \quad r(t) = 2u(t-1) - 3\delta(t-2)$$

4. Solve the following differential equation ($y(x)=?$) (20%)

$$x^2 y'' + 3xy' + y = 0, \quad y(1) = 2, \quad y'(1) = 4.$$

5. For a function $f(x)$ of period $p=2L$, ($-L \leq x \leq L$), the Fourier series of $f(x)$ can be represented as

$$f(x) = \frac{1}{2}a_0 + \sum_{n=1}^{\infty} a_n \cos\left(\frac{n\pi x}{L}\right) + b_n \sin\left(\frac{n\pi x}{L}\right)$$