

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（乙組）

准考證號碼 （考生必須填寫）

工程數學

試題 共 2 頁，第 1 頁

- 注意：a. 本試題共 題，每題 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. Solve the given initial-value problems.
 - (a) $(e^x + y)dx + (2 + x + ye^y)dy = 0, y(0) = 1$ (15%)
 - (b) $y'' + 4y' + 4y = (3 + x)e^{-2x}, y(0) = 2, y'(0) = 5$ (15%)
2. Find $i_1(t)$ and $i_2(t)$ under the conditions, $E(t) = 60V, L = 1H, R = 50\Omega, C = 10^{-4}F$, and the currents $i_1(t)$ and $i_2(t)$ are initially zero, via the Laplace transformation method in Figure 1. (15%)

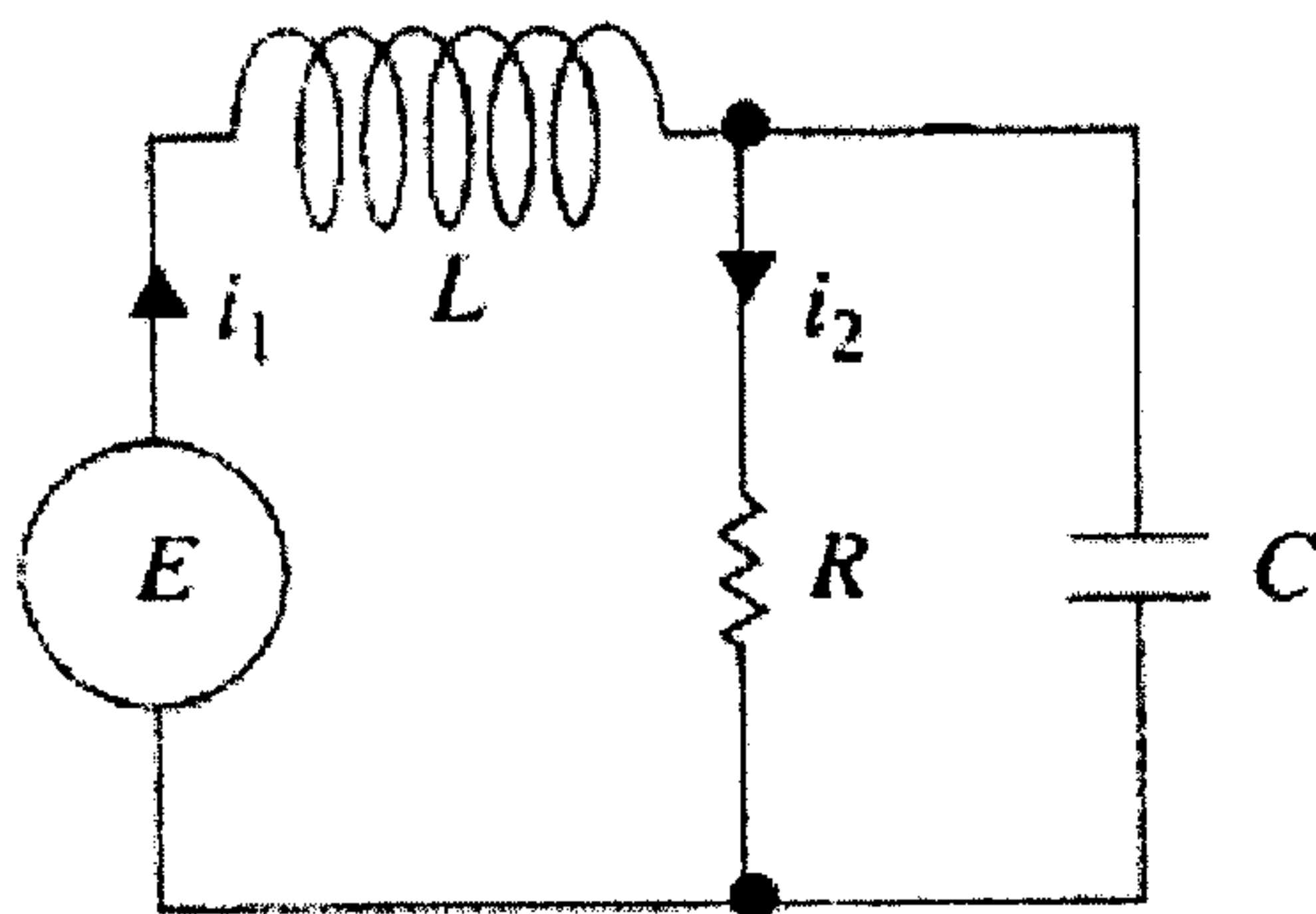


Figure 1 Electrical network

3. (a) Find the area of the triangle determined by the given points.

$$P_1(1,2,4), P_2(1,-1,3), P_3(-1,-1,2). \text{ (15\%)}$$

- (b) Find the volume of the parallelepiped for which the given vectors are three edges.

$$\mathbf{a} = \mathbf{i} + \mathbf{j}, \mathbf{b} = -\mathbf{i} + 4\mathbf{j}, \mathbf{c} = 2\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}. \text{ (15\%)}$$

4. (a) Find the eigenvalues and the eigenvectors of the matrix $\mathbf{A} = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$. (15%)

- (b) Find the inverse matrix of the matrix $\mathbf{P}$ that diagonalizes $\mathbf{A}$. (10%)