



- (15%) Solve the general solution of the following differential equations:
[解下列微分方程式之通解]
(1) $y' = 10 \sin 2x$ (5 分); (2) $y' + 3x^2 y = 2e^{-x^3}$ (5 分); (3) $y' - y = e^x y^2$ (5 分).
- (10%) Solve the general solution of the given nonhomogeneous differential equation: $y'' - 2y' = -6 + e^x$. (10 分)
- (15%) Find the Laplace transform or inverse transform of the following functions:
(1) $f(t) = t^2 - e^{-2t} + \cos 2t$; 求 $F(s) = L[f(t)]$ (5 分);
(2) $L^{-1}\left[\frac{12s}{(s-1)(s+1)(s+2)}\right]$; 求 $f(t) = L^{-1}[F(s)]$ (5 分);
(3) $L^{-1}\left[\frac{2}{s(1+e^{-as})}\right]$; 求 $f(t) = L^{-1}[F(s)]$ (5 分).
- (10%) Use the Laplace transform to solve the given initial value problem [利用拉氏轉換求解以下微分方程式; $\delta(t)$ is Dirac Delta Function]: (10 分)
 $y'' + 2y' + 5y = 6\delta(t-2)$, $y(0) = 0$, $y'(0) = 0$
- (10%) The linear system of equations is as follows. Find (a) the row-reduce form, and (b) determine whether the system has solutions.
$$\begin{aligned} 2x_1 + 4x_2 + 6x_3 &= 18 \\ 4x_1 + 5x_2 + 6x_3 &= 24 \\ 2x_1 + 7x_2 + 12x_3 &= 40 \end{aligned}$$
- (10%) Consider the matrix $A = \begin{bmatrix} 1 & 2 & -2 & 1 \\ 3 & 6 & -5 & 4 \\ 1 & 2 & 0 & 3 \end{bmatrix}$. Let $N(A)$ denote the null space of A . Find $N(A)$, rank, and nullity of the matrix A .
- (10%) Find the solution $\mathbf{x}$ of the least squares equation. $\mathbf{Ax} = \mathbf{b}$;
$$\begin{bmatrix} 1 & 1 \\ 1 & 2 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \\ 3 \end{bmatrix}$$
- (20%) Determine whether the following subsets is a subspace of $\mathbb{R}^3$.
(a) $W_1 = \{(x_1, x_2, 1) : x_1 \text{ and } x_2 \text{ are real numbers}\}$
(b) $W_2 = \{(x_1, x_1 + x_3, x_3) : x_1 \text{ and } x_3 \text{ are real numbers}\}$



國立雲林科技大學 110 學年度
碩士班招生考試試題

系所：電機系

科目：電路學

1. 求圖一的電路中，等效電阻 R_T 之值。(10%)
2. 求圖二的直流電路中，兩節點電壓 V_1 及 V_2 之值。(20%)

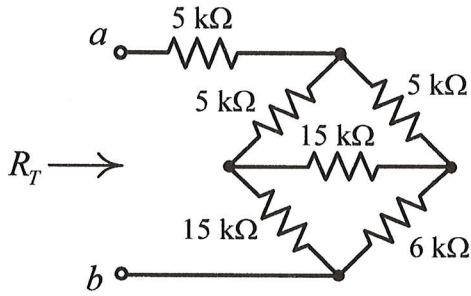


圖 一

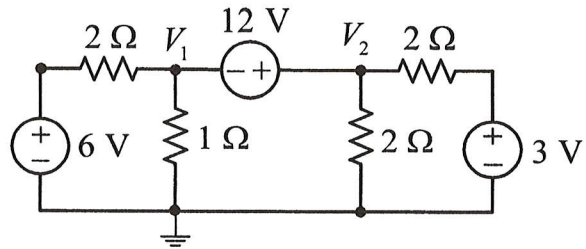


圖 二

3. 圖三電路中的開關已經閉合很久，在 $t=0$ 時開啟，試求 $t>0$ 時，電流 $i(t)$ 的表示式。(20%)

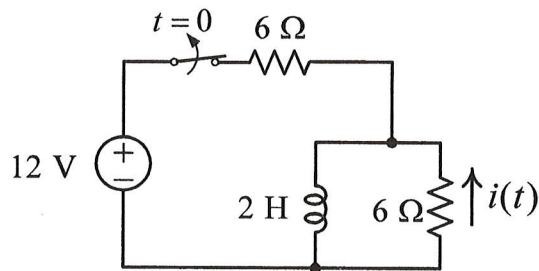


圖 三

4. 如圖四所示之電路，請使用節點電位法求出 I_1 、 I_2 、以及 I_3 分別為多少安培(A)? (15%)

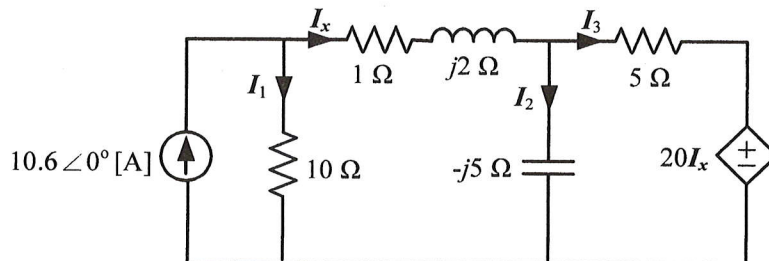


圖 四



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5. 有一平衡三相三線式電源，相序為 ABC，其中參考相之線電壓有效值為 $V_{BC} = 220 \angle 0^\circ \text{ V}$ ，此電源連接一不平衡三相負載，並以兩瓦特表量測三相功率，如圖五所示。請計算 W_A 與 W_C 之讀數分別為多少? (20%)

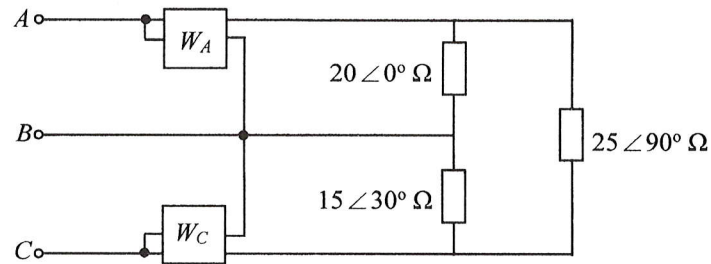


圖 五

6. 如圖六所示之理想變壓器電路，請計算輸出電壓 V_o ，及電源所供應之複功率分別為多少? (15%)

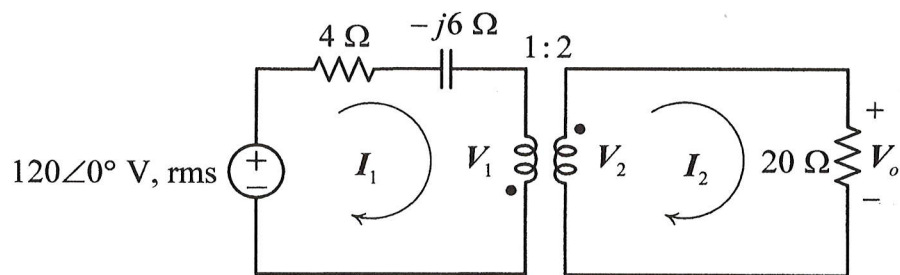


圖 六