

國立臺灣科技大學 102 年度電力電子產業碩士專班招生(秋)試題
 系所組別：電力電子領域
 科目：電路學

(總分為 100 分)

不得使用計算器

1. Find the Norton equivalent of the circuit in Figure 1. (10 分)

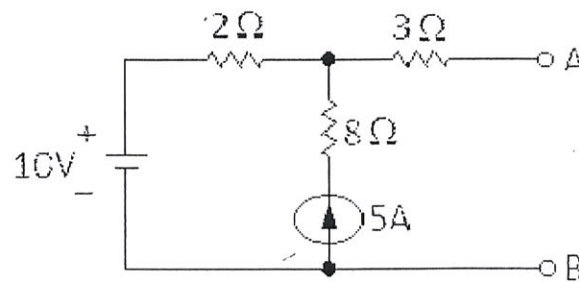


Figure 1

2. Find the equivalent capacitance of the circuit in Figure 2. (10 分)

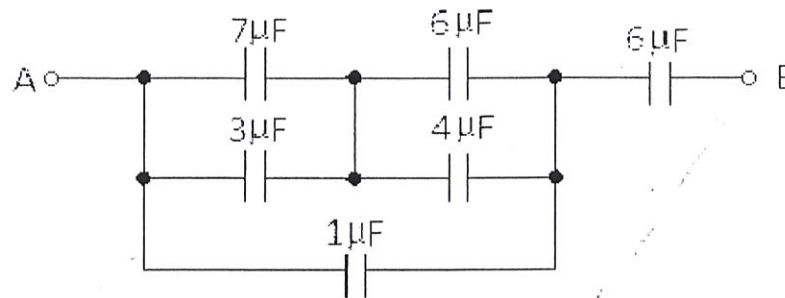


Figure 2

3. Derive the transfer function and 3dB frequency of the one-pole low-pass filter in Figure 3. (15 分)

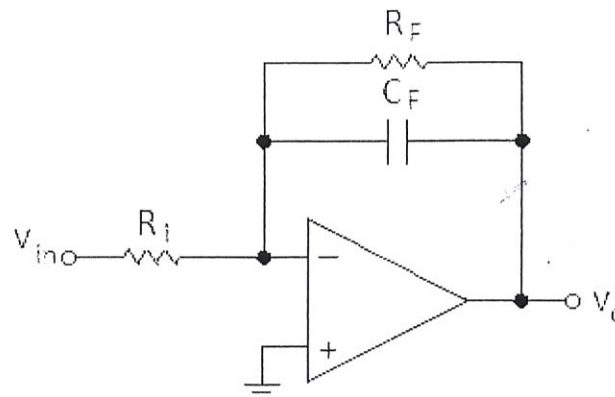


Figure 3



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4. Describe the circuit principle of the precision half-wave rectifier in Figure 4. (15 分)

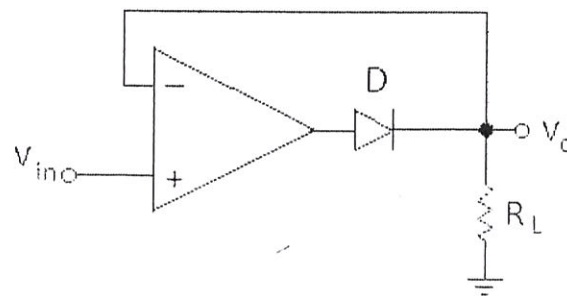


Figure 4

5. The circuit shown in Figure 5 is driven by the voltage source $v_s(t)$, which is a unit step function.
- Find the transfer function of $\frac{I(s)}{V_s(s)}$. (15 分)
 - Find the time-domain response of $i(t)$ with zero initial conditions by applying partial fraction expansion technique. (15 分)
 - Please find $i(0^+)$ and $v(0^+)$. (10 分)

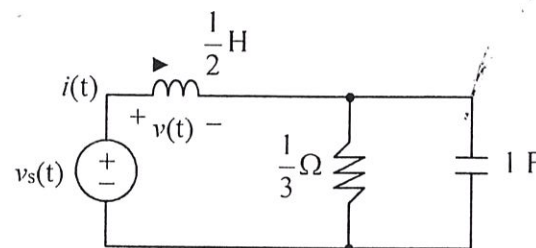


Figure 5

6. The voltage and current of an AC load are $v(t) = 120 \cdot \sin(\omega t + 75^\circ)$ V and $i(t) = 5 \cdot \sin(\omega t + 15^\circ)$ A, respectively. Please determine the average power supplied to the load. (10 分)

