國立臺灣大學 114 學年度碩士班招生考試試題

1. Explain the definition of the following terms: a) Instantaneous Power, b) Complex Power, c) Apparent Power, d) Reactive Power, e) Power Factor. [20]

2. For the circuit shown in Figure 2, please find V_a and I_b when $I_1 = V_a/3$. [20]

3. The circuit shown in Figure 3 has the input voltage $v_s(t) = 0V$ for $t < 0$, and $v_s(t) = 5V$ for $t \geq 0$. Please find both $i_s(t)$ and $v_c(t)$ for $t \geq 0$. [20]

4. An AC voltage source Vs provides electric energy for the network load, Z_1 and Z_2, via a transmission line Z_{line} as shown in Figure 4, where $Vs = 220\angle 0^\circ V_{rms}$, $Z_1 = (10+j5)\Omega$, $Z_2 = (8+j4)\Omega$, $Z_{line} = (0.2+j0.1)\Omega$. Please determine: a) the load current I_2, b) the reactive power consumed by Z_1, c) the power factor (PF) of the network load, d) the active power supplied by the voltage source Vs. [20]

5. A complex circuit can be simplified as a transfer function, H(s), as listed in equation (1) with one input $v_{in}(s)$ and one output $v_{out}(s)$, as shown in Figure 5. a)Draw the asymptotic Bode plot of the gain for the transfer function H(s), clearly marking all critical **turning points** and indicating the **slopes** in each region. [15] b)determine the voltage gain $G_v(s) = v_{out}(s)/v_{in}(s)$ in decibels (dB) at the frequency of 200 rad/sec. [5]

$$H(s) = \frac{8s^2}{(s+50)(s+500)} \qquad (1)$$

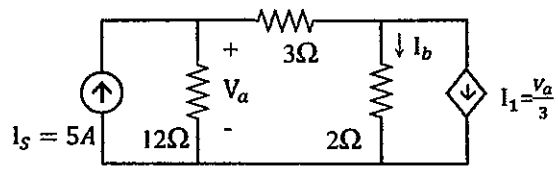

Figure 2

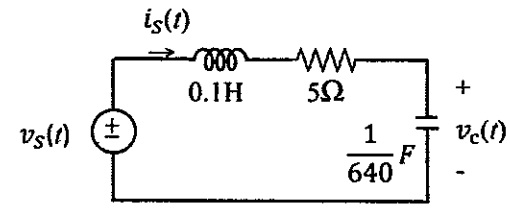

Figure 3

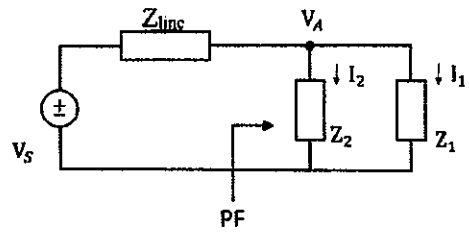

Figure 4

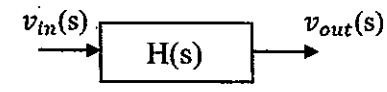

Figure 5

試題隨卷繳回