

# 國立中山大學九十四學年度碩士班招生考試試題

科目：基礎電路學【電機系碩士在職專班】

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- (20%) 1. For the circuit of Fig 1, find the smallest permissible value of  $R_{L2}$  so that the fuse will not blow. Each resistor could represent an electric appliance in a typical home

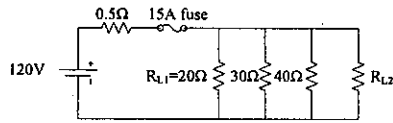


Figure 1

- (20%) 2. (a) Find the value of  $R_L$  for maximum power transfer in the circuit of Fig.2  
(b) Find the maximum power.

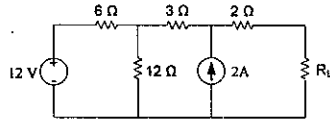
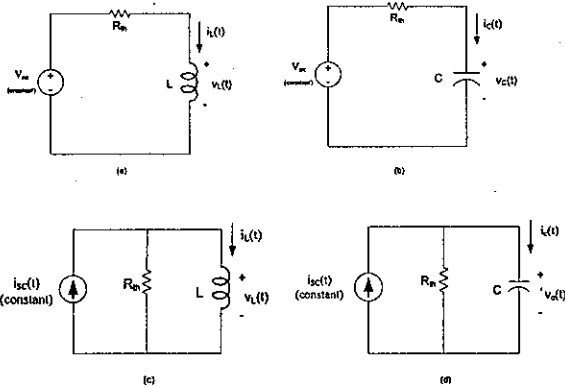


Figure 2

- (20%) 3. Use the circuit models of inductor and capacitor, KVL, KCL, and Ohm's law to derive the differential equations characterizing the following circuits' voltage and current responses, i.e., in forms of  $\frac{dx}{dt} = Ax + B$ , where  $x = i_L(t)$  or  $v_C(t)$



- (20%) 4. In the circuit of Fig 4,  $Z_1 = 0.1 + j0.1 \Omega$ ,  $Z_2 = 0.4 + j2.2 \Omega$ ,  $Z_3 = 0.2 + j0.2 \Omega$ ,  $V_a = 104 + j50 \text{ V}$ , and  $V_b = 106 + j48 \text{ V}$  at 60 Hz.  
(a) Find the voltage  $V_2$  in polar and rectangular forms.  
(b) Find the complex power absorbed by each of the three impedances and then the power delivered by the two sources.

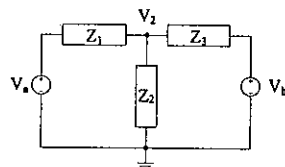


Figure 4

- (20%) 5. For the circuit of Fig 5, compute the input impedance  $Z_{in}(j\omega)$  when  $\omega = 500 \text{ rad/s}$ .

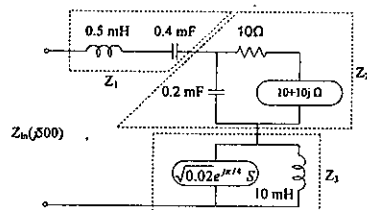


Figure 5