

# 國立中山大學 104 學年度碩士暨碩士專班招生考試試題

科目名稱：電路學【電機系碩士班丁組】

題號：431007

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（問答申論題） 共 1 頁 第 1 頁

**PROBLEM 1 (40%)** Figure 1(b) shows the waveforms of the line-to-line voltage and the phase current of a three-phase motor (balanced Y-connected load) in Fig. 1(a). Answer the following questions.

- (a) (10%) Estimate  $L$  and  $R$ .
- (b) (10%) Estimate the average power consumed by the motor.
- (c) (20%) Connect balanced Y-connected capacitors in parallel with the motor to increase the power factor. Determine the capacitance value in each phase so that the power factor is close to 1.

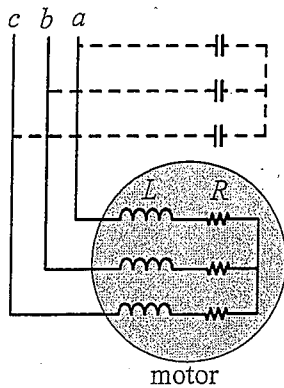


Fig. 1(a)

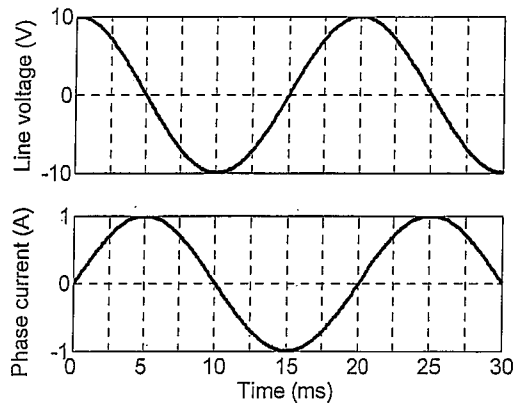


Fig. 1(b)

**PROBLEM 2 (20%)** Figure 2(b) displays the Bode magnitude plot of a lowpass filter in Fig. 2(a). Estimate the values of  $R$  and  $C$ .

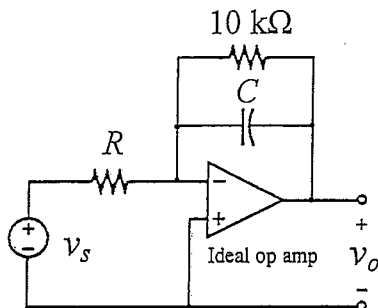


Fig. 2(a)

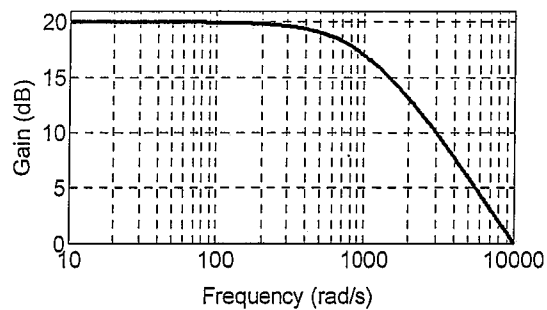


Fig. 2(b)

**PROBLEM 3 (20%)** Determine the values of  $R$  and  $C$  in Fig. 3 so that the average power dissipation on resistor  $R$  is maximized.

**PROBLEM 4 (20%)** The two inductors in Fig. 4 are unity coupled. Find the transfer function  $I_2(s)/I_1(s)$ .

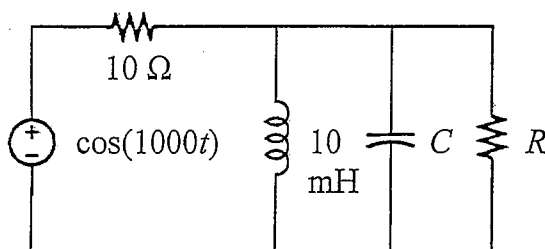


Fig. 3

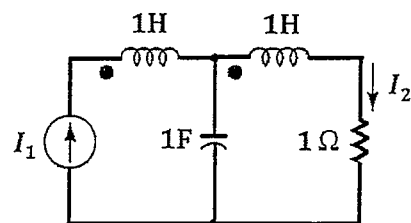


Fig. 4