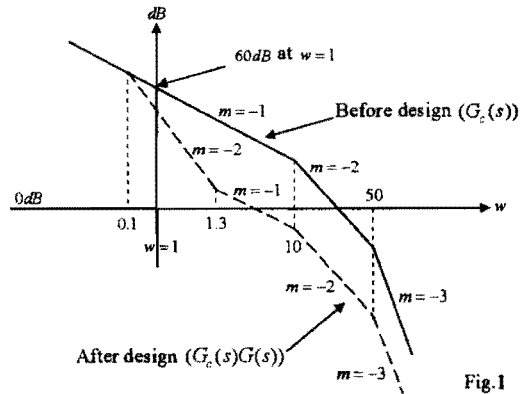


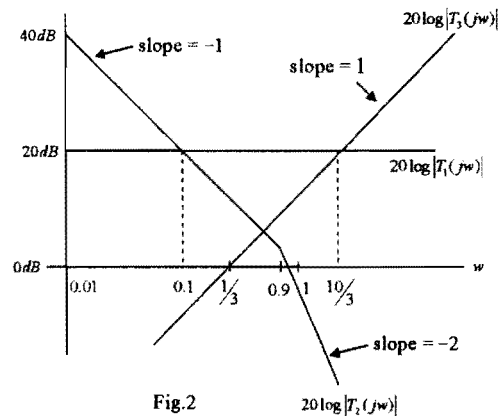
Please follow the order to answer the following problems. (請按題號次序作答)

1. The Bode diagrams shown Fig. 1 are before and after compensation of an open-loop feedback system. Determine the transfer function $G_c(s)$ of the compensation network. (15%)

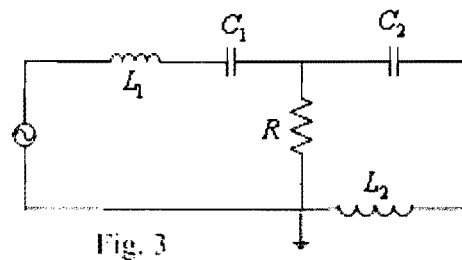


2. Given the three transfer functions whose asymptotic log-modulus are drawn as in Fig. 2. Note that there are no right-half-plane poles or zeros. Determine the transfer function

$$T(s) = \frac{T_1(s)T_2(s)}{1+T_1(s)T_2(s)+T_2(s)T_3(s)} \quad (15\%)$$



3. Given the system shown in Fig. 3, the state-space model of the system is given by $\dot{x}(t) = Ax(t) + Bu(t)$. What are state variables in $x(t)$? Also, show the reasons for your answer. (20%)



(背面仍有題目,請繼續作答)

4. Short answer questions:

- a). Please depict the functions of commutators and brushes in DC machine. (5%)
- b). Explain why the dc series motor can not be operated under no load condition. (5%)
- c). List and describe the types of losses that occur in a transformer. (5%)
- d). What is the relationship between electrical frequency and magnetic field for an ac machine? (5%)

- 5. a) Figure 4a shows a triangle voltage fed to a L-R load, please compute the average voltage on L at steady state condition. (5%)
- b) Figure 4b shows a triangle current fed to a C-R load, please compute the average current on C at steady state condition. (5%)

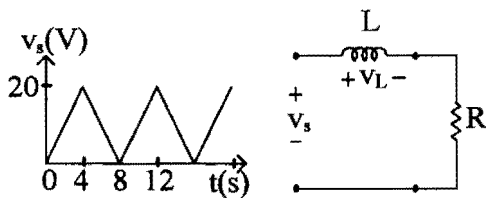


Fig. 4a

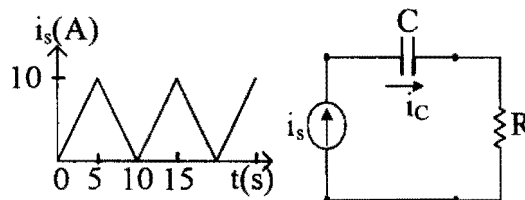


Fig. 4b

- 6. Please find the power associated with each source in the circuit shown in Fig.5. (10%)
- 7. Please explain the reason why two wattmeters can be used to measure the average power delivered to a 3φ balanced load. The circuit diagram is shown in Fig. 6. (10%)

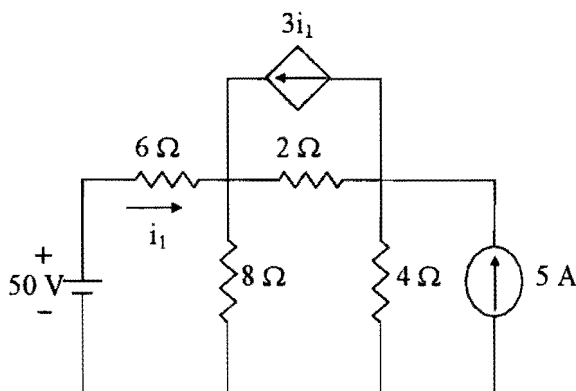


Fig. 5

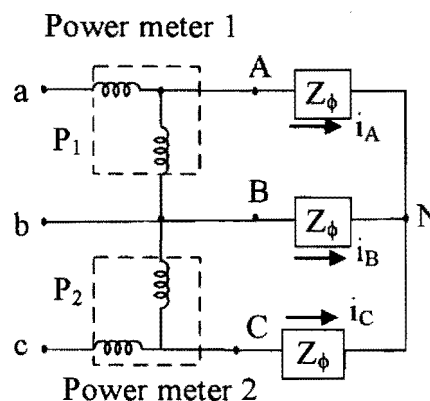


Fig. 6