

國立成功大學

112學年度碩士班招生考試試題

編 號： 171

系 所： 電機工程學系

科 目： 電路學

日 期： 0206

節 次： 第 1 節

備 註： 可使用計算機

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. For the circuit depicted in Fig. 1,
 - (a) find the Thevenin equivalent circuit between terminals a and b , and (15%)
 - (b) find the maximum power transfer to R_o , where R_o is a variable resistor. (5%)
2. The ideal switch in the circuit of Fig. 2 has been in position a for a long time. At $t = 0$ s the switch moves to position b . Find $v_o(t)$ for $t \geq 0$ s. (15%)
3. The operational amplifier in Fig. 3 is ideal. Find the values of R_f , R_b , and R_c to satisfy $v_o = 3v_a + 2v_b + v_c$. (15%)

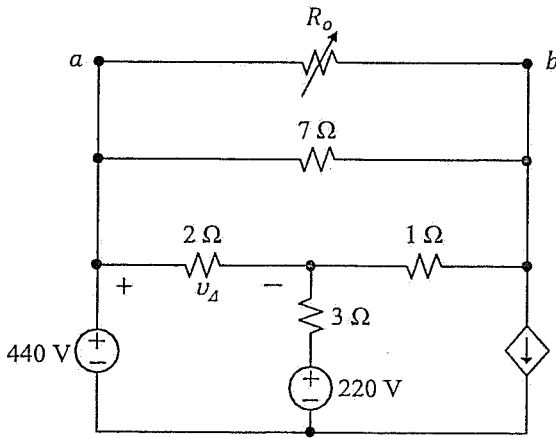


Fig. 1

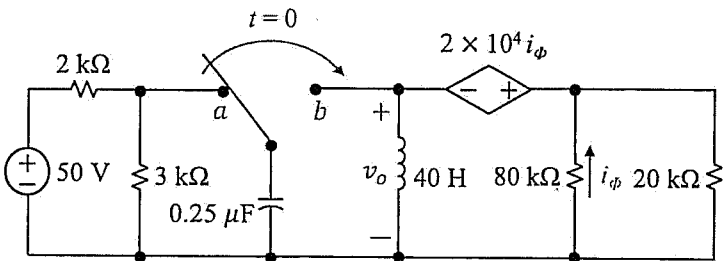


Fig. 2

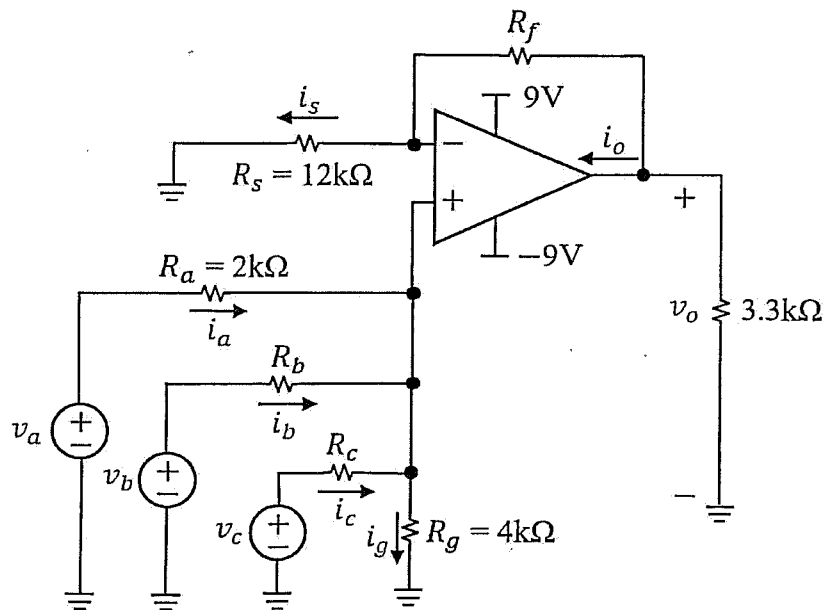


Fig. 3

4. For the circuit shown in Fig. 4 at terminals $a-b$, please obtain (a) the Thevenin equivalent circuit and (b) the Norton equivalent circuit. (20%)

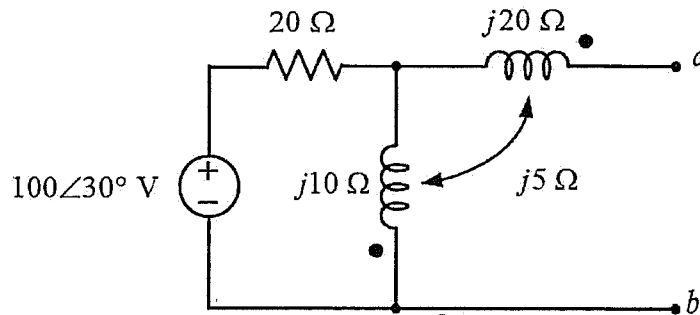


Fig. 4

5. A single-phase 550-V, 60-Hz feeder line illustrated in Fig. 5 supplies an industrial load consisting of an induction motor drawing 60 kW at 0.75 pf (inductive), an ideal capacitor bank with a rating of 20 kVAR, and a purely-resistive lighting load drawing 20 kW. (a) Calculate the total active power, reactive power, apparent power, and complex power absorbed by the industrial load. (b) Determine the overall power factor (pf) and pf angle. (c) Solve the current flowing in the feeder line. (20%)

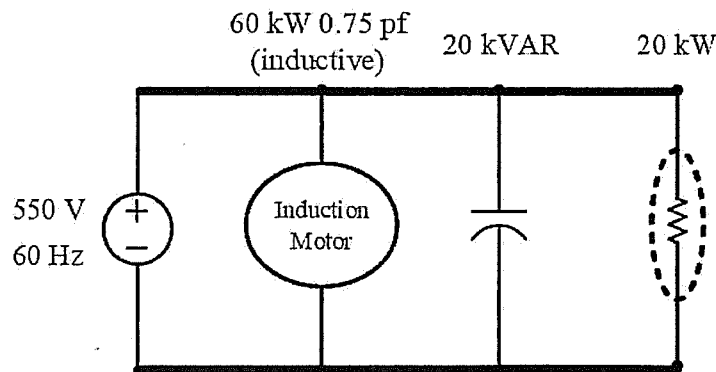


Fig. 5

6. Express the transfer function $\mathbf{H}(s) = \mathbf{V}_o(s)/\mathbf{V}_i(s)$ for each of the active filters using ideal operational amplifiers depicted in Fig. 6. (10%)

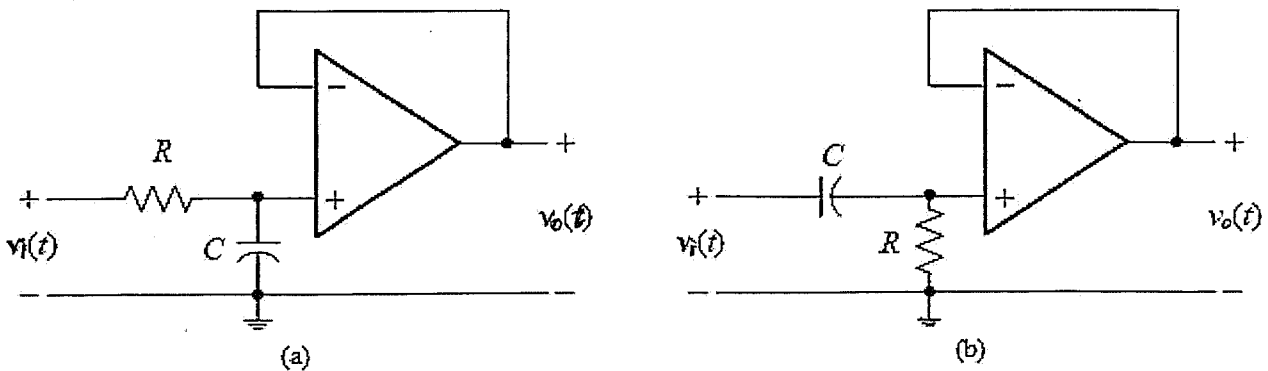


Fig. 6