國立成功大學

113學年度碩士班招生考試試題

編　號：168

系　所：電機工程學系

科　目：電路學

日　期：0201

節　次：第 1 節

備　註：可使用計算機

編號：168

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1. Two three-phase balanced loads are connected to a 240-kVrms, 60-Hz line as shown in Fig. 1. Load 1 draws 30 kW at a power factor of 0.6 lagging, while load 2 draws 45 kVAR at a power factor of 0.8 lagging. Assume *abc* phase sequence. Determine:
   (a) the complex power absorbed by the combined load, (5%)
   (b) the three-phase line currents of the combined load, and (9%)
   (c) the kVAR rating of the Δ-connected capacitor bank in parallel with the combined load will raise the power factor to 0.9 lagging and the capacitance of each capacitor. (6%)

2. An active filter is shown in Fig. 2.
   (a) Find the transfer function of $\mathbf{V}_o/\mathbf{V}_i$. (10%)
   (b) Determine the type and the order of the filter. (5%)

3. Refer to the circuit in Fig. 3.
   (a) Find the phasor currents $\mathbf{I}_1$, $\mathbf{I}_2$, and $\mathbf{I}_3$. (10%)
   (b) Find the power dissipated in the 40-Ω resistor. (5%)

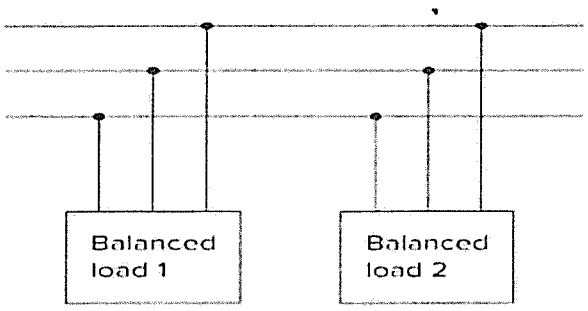

Fig. 1.

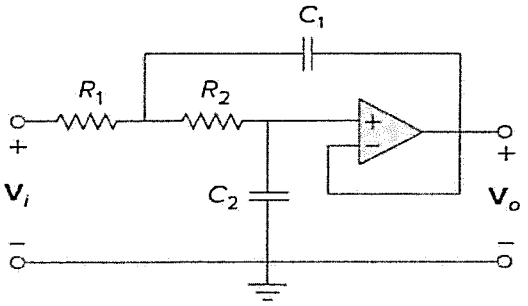

Fig. 2.

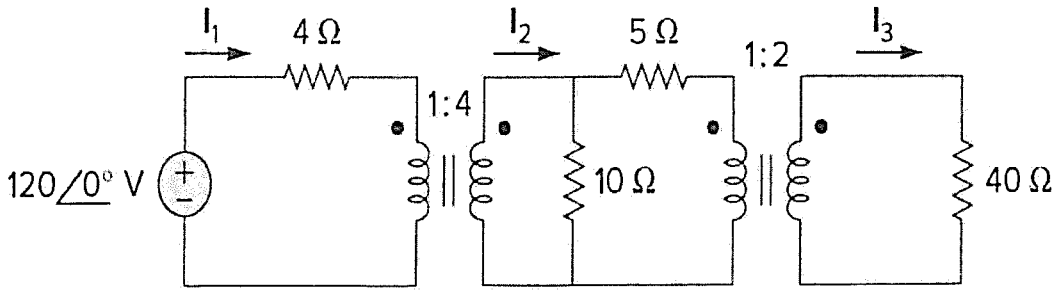

Fig. 3.

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4. Determine the equivalent inductance L_{eq} as seen at the terminals a-b of Fig. 4. (25%)

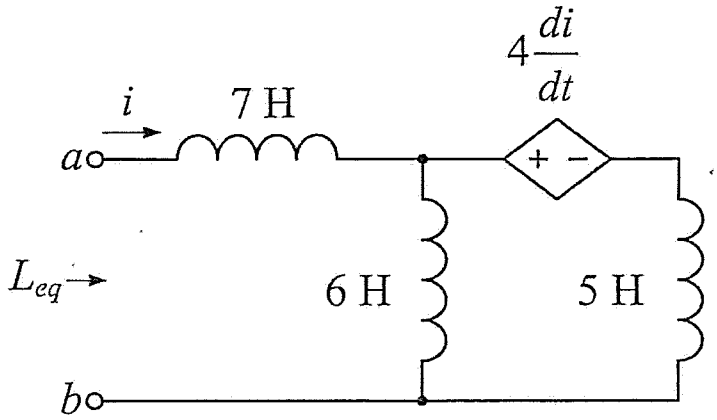

Fig. 4.

5. If $v_1(0^+) = 10$ V, $v_2(0^+) = 0$ V, $R_U = R_D = 100$ kΩ, and $C_1 = C_2 = 0.1$ μF are employed for the ideal operational amplifier circuit shown in Fig. 5, find the output voltage $v_o(t)$ for $t > 0$ s. (25%)

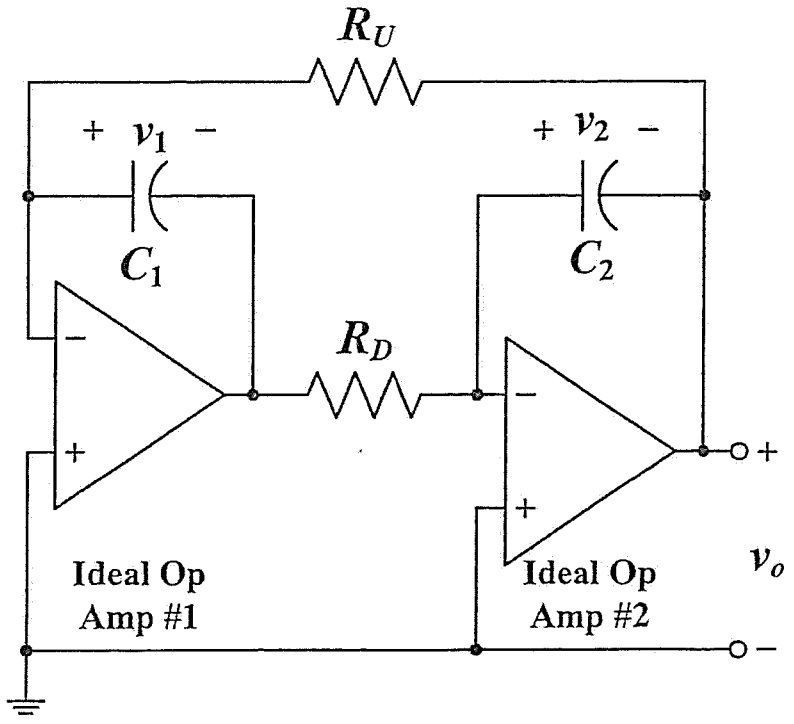

Fig. 5.