國立成功大學

111學年度碩士班招生考試試題

編　號：170

系　所：電機工程學系

科　目：電路學

日　期：0219

節　次：第 1 節

備　註：可使用計算機

編號： 170

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1. For the circuit shown in Fig. 1,
   (a) find the Norton equivalent circuit between terminals *a* and *b*, and (15%)
   (b) find the maximum power deliverable to R_L. (5%)
2. The circuit in Fig. 2 is a differential amplifier driven by a bridge. Given $v_i = 15.5$ mV, find v_a, v_b, and v_o, respectively. (15%)
3. Given $C = 0.2$ F, $L = 20$ H, and $i_S(t) = 3.5u(t)$ A in the circuit of Fig. 3, find $v_C(t)$ and $i_L(t)$. (15%)

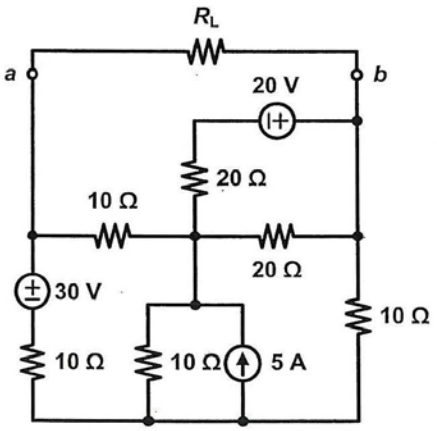

Fig. 1

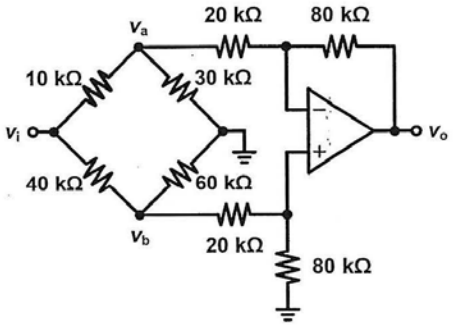

Fig. 2

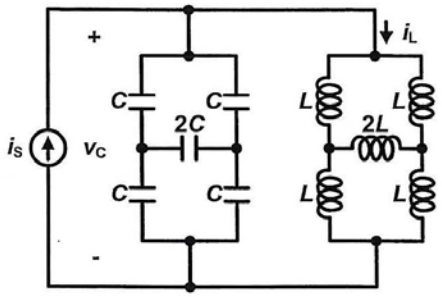

Fig. 3

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4. The ideal op amp circuit shown in Fig. 4 has the parameters: $R_i = 2R_f$=10 kΩ, L = 5 mH, and $C_1 = C_2$ = 1 μF. Find the op amp circuit's oscillation frequency in rad/s. (10%)

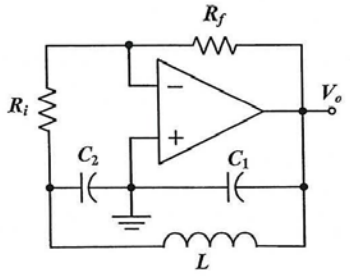

Fig. 4

5. Find the impulse response of the circuit having the following transfer function. (10%)

$$H(s) = \frac{s+4}{(s+1)(s+2)^2}$$

6. For the three-phase circuit shown in Fig. 6, assume the two wattmeters are properly connected to the unbalanced three-phase load ($\mathbf{Z}_{AB} = 20\ \Omega$, $\mathbf{Z}_{BC} = 10 - j10\ \Omega$, and $\mathbf{Z}_{CA} = 12 + j5\ \Omega$) supplied by a balanced three-phase source such that $\mathbf{V}_{ab} = 208\angle 0°$ V with *abc* phase sequence. Obtain the readings of the two wattmeters first, and then calculate the total active power, total reactive power, total apparent power, total complex power, and total power factor of the unbalanced three-phase load. (30%)

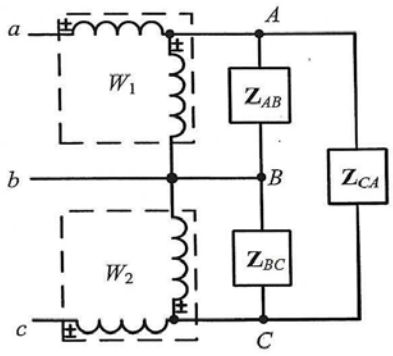

Fig. 6