

※ 考生請注意：本試題可使用計算機，並限「考選部核定之國家考試電子計算器」機型

1. In Fig. 1, Switch  $S$  is closed at  $t = 0$ , after it has been open for a long time. Please determine  $v(t)$ , for  $t \geq 0$ . (20%)

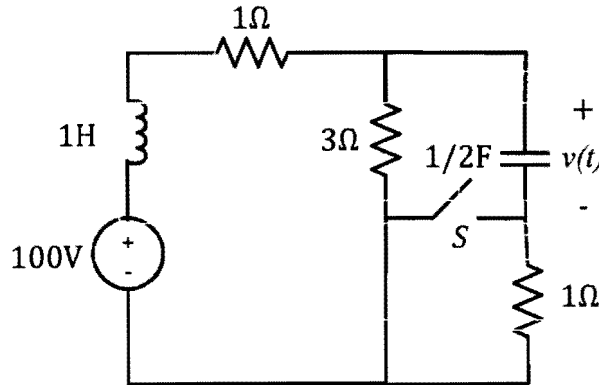


Fig. 1

2. Please determine the value of  $R$  to have it obtain maximal power from  $v(t)$  and answer what maximal power is obtained by the load  $R$ ? (20%)

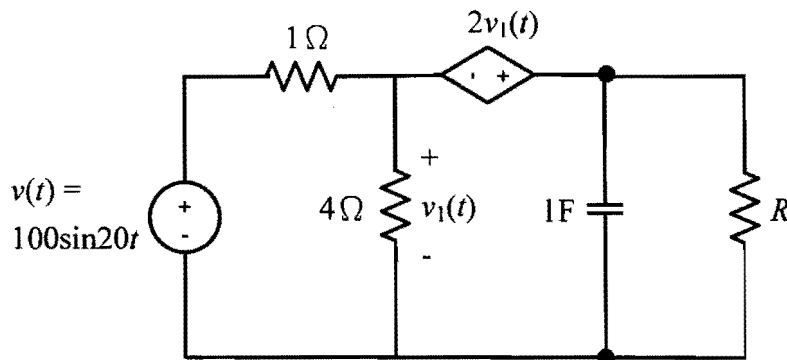


Fig. 2

3. In Fig. 3,  $v(0) = 20V$ . Please determine and sketch  $v(t)$  for  $t \geq 0$ , as  $\mu = 1$ . Is this circuit stable? What is the value range of  $\mu$  making the circuit stable? (10%)

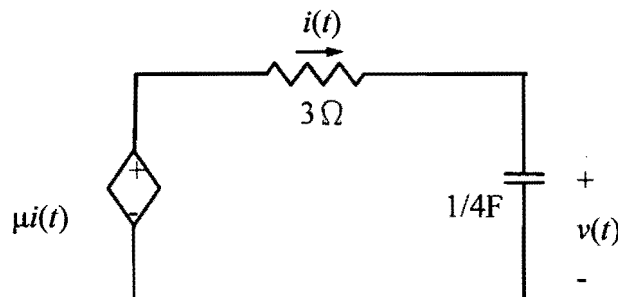


Fig. 3

(背面仍有題目,請繼續作答)

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4. Two three-phase balanced loads are connected to a three-phase, 11.4 kV, 60 Hz balanced power source. Load *A* is Y-connected with per-phase impedance of  $30 + j40 \Omega$  while load *B* is a  $\Delta$ -connected induction motor that operates at a rated load of 120 hp (1 hp = 746 W) under full-load efficiency of 90% and full-load power factor of 0.8 lagging. Assume *abc* sequence. Determine: (a) the complex power, active power, and reactive power absorbed by the combined load and the power factor of the combined load (12%), and (b) the per-phase capacitance of the  $\Delta$ -connected capacitor bank connected in parallel with the combined load to raise total power factor to unity. (8%)
5. The operational amplifier circuit shown in Fig. 4 is used to operate as an oscillator. Solve: (a) the ratio of  $V_2/V_o$  (10%), and (b) the oscillation frequency in Hz (10%).

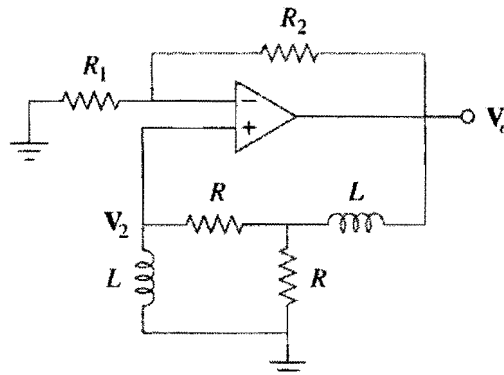


Fig. 4

6. For the circuit shown in Fig. 5, determine its resonance frequency. (10%)

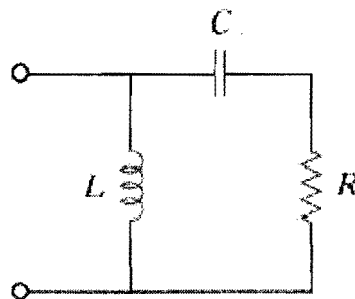


Fig. 5