1. Use superposition to find V_o in the network shown in Fig. 1. [17%]

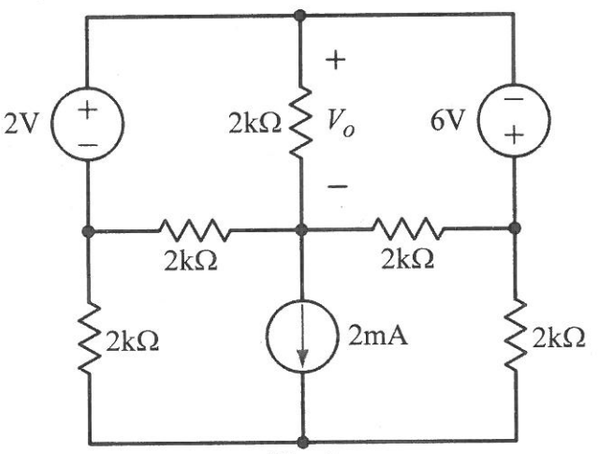

Fig. 1

2. The switch in the circuit in Fig. 2 opens at $t = 0$. Find $i(t)$ for $t > 0$. [15%]

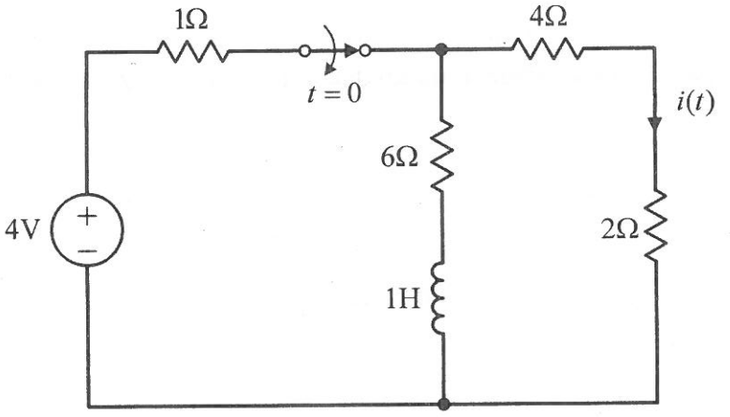

Fig. 2

3. An ideal op-amp circuit is shown in Fig. 3: (a) derive the relationship of the input voltage $v_i(t)$ and the output voltage $v_o(t)$; [6%] (b) determine the output voltage $v_o(t)$ if the input voltage $v_i(t)$ is given as: (i) 2V; (ii) $5\sin 20t$ V; (iii) $10e^{-2t}$ V. ($R = 1\text{k}\Omega, C = 10\mu\text{F}$) [12%]

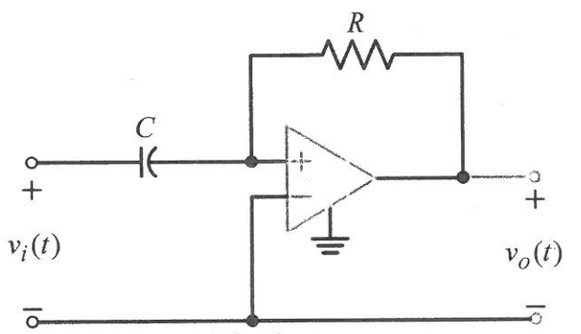

Fig. 3

4. Find the $\mathbf{V}_o$ in the circuit in Fig.4. [15%]

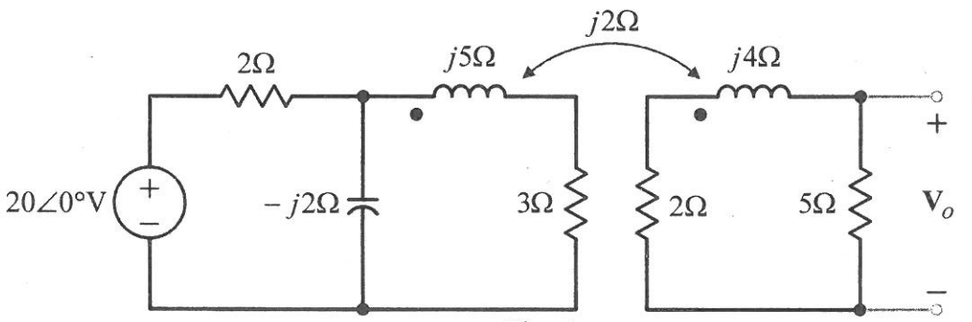

Fig. 4

5. A plant consumes 25kW at a power factor of **0.8 lagging** from a 220Vrms 60Hz line. Determine the value of the capacitor that when placed in parallel with the load will change the load power factor to **0.95 leading**. [15%]

6. Determine the impedance $\mathbf{Z}_L$ in Fig.6 for maximum average power transfer and also find the value of the maximum average power that can be transferred to $\mathbf{Z}_L$. [20%]

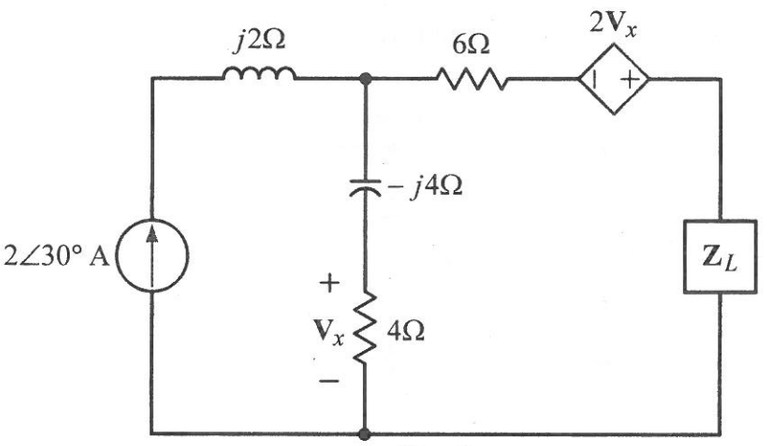

Fig. 6