(ii) the energy stored in the inductor at $t = 0$,

(iii) the voltage across inductor, $v_L(t)$, $t \geq 0$.

(b) (6%) Determine the equivalent capacitance at terminals $\boldsymbol{a}, \boldsymbol{b}$ of the circuit in Fig. 6.

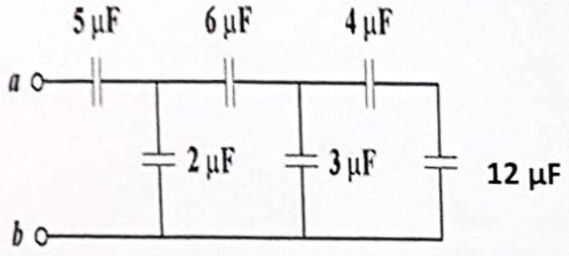

Fig. 6

7. (10%) For the circuit in Fig. 7, please find the voltage v_C, the current i_L, the energy stored in the capacitor W_c and inductor W_L under the dc condition.

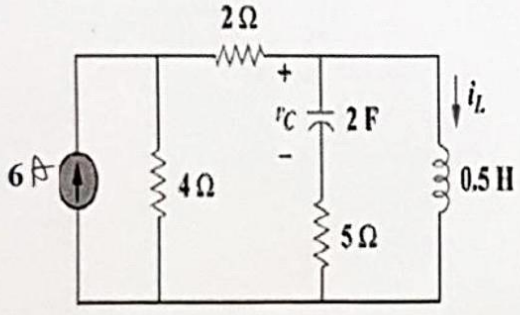

Fig. 7

8. (15%) Please derive the differential equation for the circuit in Fig. 8. with respect to the output $v_o(t)$ and the input $f(t)$.

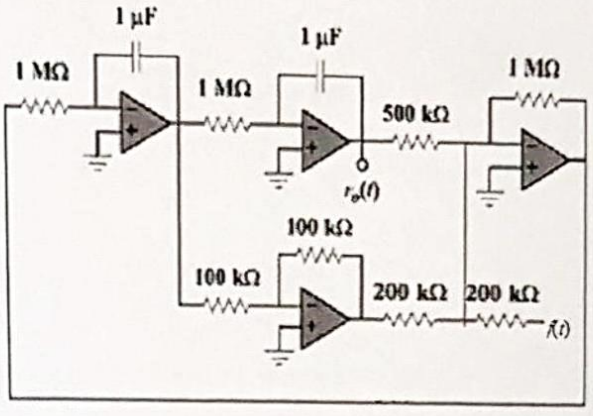

Fig. 8

9. (10%) Design an analog circuit based on op-amp to solve the following differential equation:

$$\frac{dv_0(t)}{dt} + v_0(t) = \sin 2t, \quad t \geq 0$$

with the initial voltage $v_0(0) = 1$.