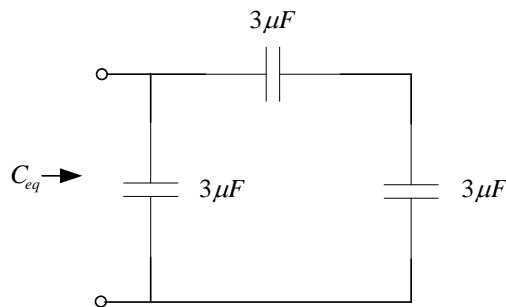


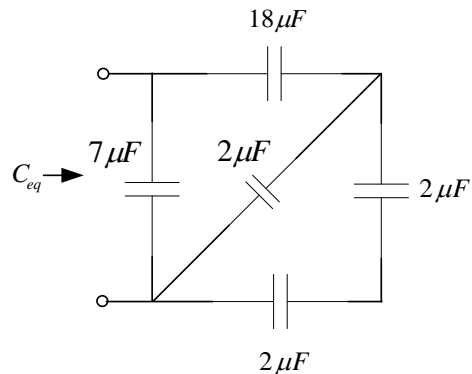
# CG1108 AY2010/11 Sem2

## Tutorial 4

1. A voltage of 50V appears across a 10 $\mu$ F capacitor.
  - a) Determine the magnitude of net charge stored on each plate and total net charge on both the plates.
  - b) Calculate the energy stored in the capacitor.
  - c) If the capacitor is discharged by a steady current of 100 $\mu$ A. How long does it take to discharge the capacitor to 0V?
2. Find the equivalent capacitance for each of the circuits shown in the figure.

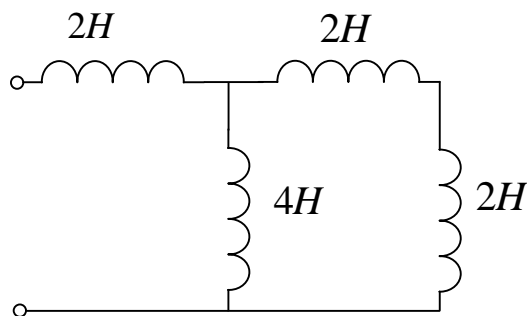


(a)



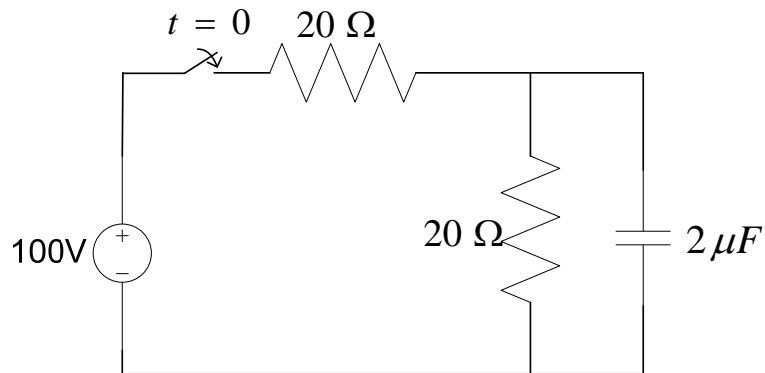
(b)

3. A constant voltage of 30V is applied to a 60 mH inductance. The current in the inductor was zero at  $t=0$ .
  - a) At what time does the current reach 2A?
  - b) What is energy stored in the inductor when the current is 2A?
4. Find the equivalent inductance of the circuit below.



5. If the switch in the circuit is closed at  $t=0$ ,
- Determine the current flowing through the resistors and the capacitor when  $t=0+$  (immediately after the switch is closed).
  - What will be the current flow under steady state condition?
  - Determine the voltage across the capacitor under steady state condition.
  - Find an expression for the capacitor voltage as a function of time  $t>0$ .

Assume that the capacitor is initially uncharged.



6. For the circuit given below, switch  $S_2$  was closed for a long time before  $t=0$ . At  $t=0$ , the switch  $S_1$  is closed and  $S_2$  is opened.
- Find the inductor current  $i(t)$  at  $t=0+$ .
  - Find the time constant  $\tau$  for  $t>=0$ .
  - Find an expression for  $i(t)$ , and sketch the function.
  - Find  $i(t)$  for each of the following values of  $t$  zero, the time constant, twice the time constant, five times the time constant and ten times the time constant.

