Department of ECE, Bennett University

CSET102: Introduction to Electrical and Electronics Engineering

Tutorial Sheet-7

Topics Covered: Capacitance, Inductance, Impedance

1. Find the equivalent capacitance of the networks shown in fig. 1 through fig. 6.

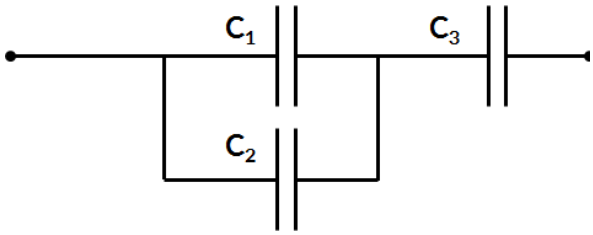

Fig. 1

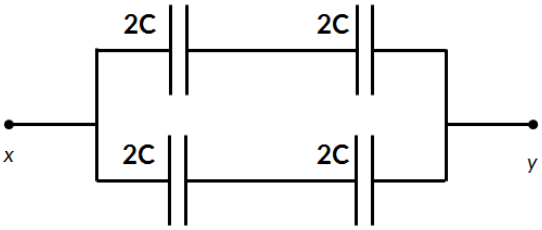

Fig. 2

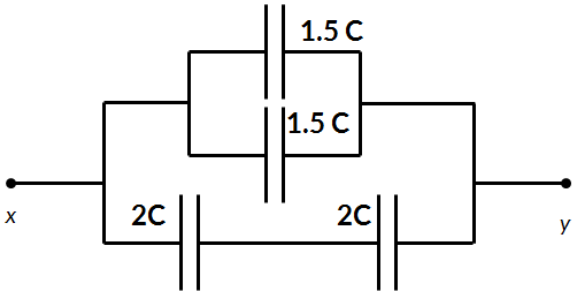

Fig. 3

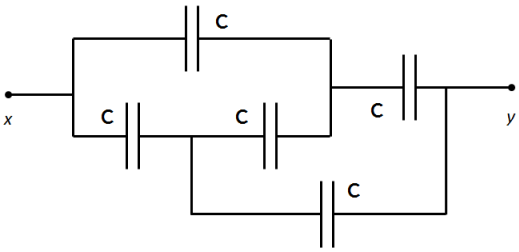

Fig. 4

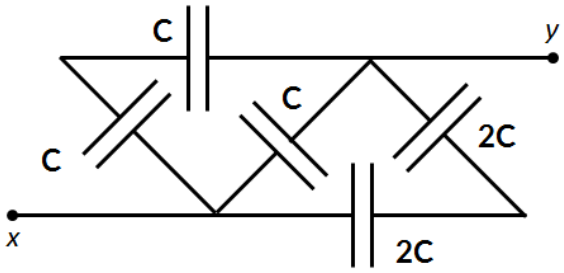

Fig. 5

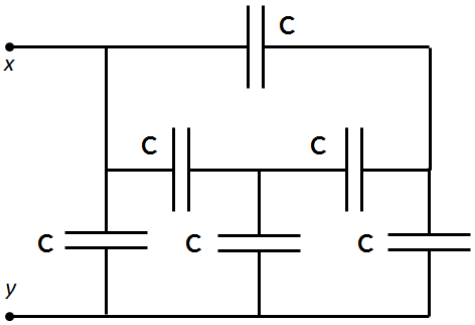

Fig. 6

2. Find the equivalent impedance (impedance between points *A* and *B* for the circuit shown in Fig. 7. Given that $\omega = 2.5 \times 10^3$ rad/sec.

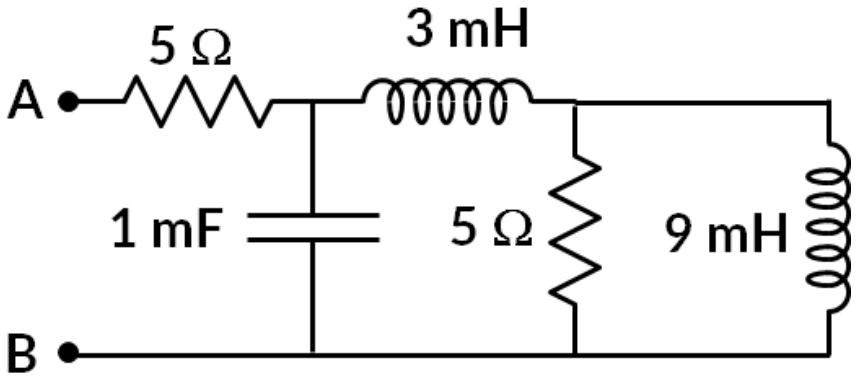

Fig. 7

3. For the circuit shown in Fig. 8, for ω = 4000 rad/sec, the impedance across *A* and *B* is $(25 + j10)\ \Omega$. What is the value of inductor?

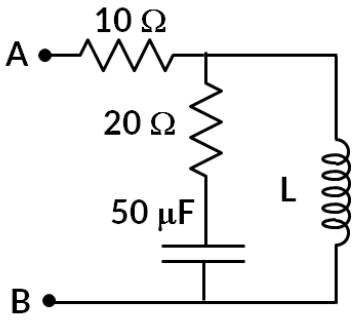

Fig. 8

4. In the circuit shown in Fig. 9, find the charge and energy stored by the 20 μF capacitor.

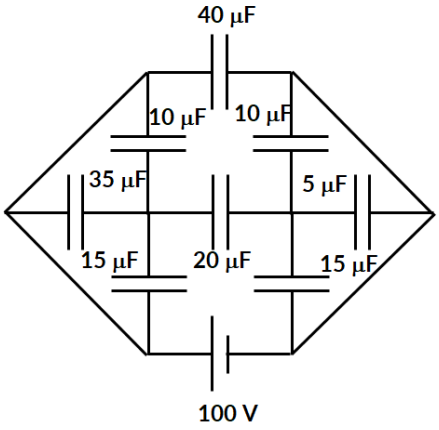

Fig. 9

Topics Covered: Filter Circuits

1. For the circuit shown in Fig. 1, identify the filter type, find the transfer function and cut-off frequency of the filter. The output of the filter is taken between nodes *C* and *D*.

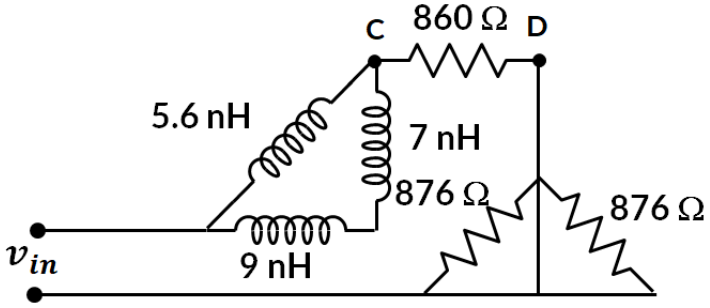

Fig. 1

2. For the circuit shown in Fig. 2, identify the filter type, find the transfer function and cut-off frequency of the filter. The output of the filter is taken between nodes *C* and *D*.

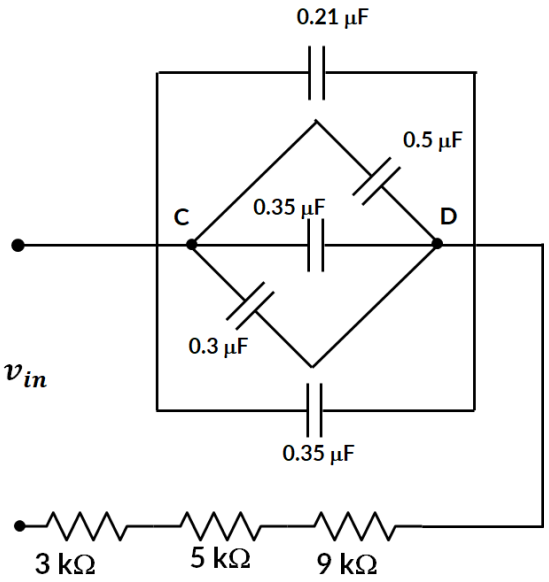

Fig. 2

3. For the circuit shown in Fig. 3, identify the filter type, find the transfer function and cut-off frequency of the filter. The output of the filter is taken between nodes *C* and *D*.

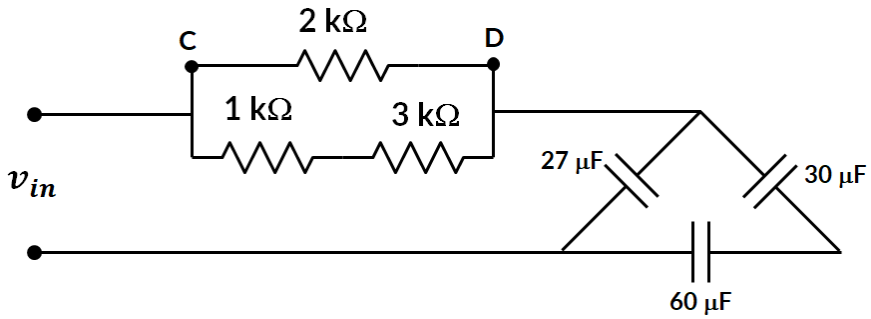

Fig. 3

4. For the circuit shown in Fig. 4, identify the filter type, find the transfer function and cut-off frequency of the filter. Input and output to the filter are between *A* and *B*; *B* and *C* respectively.

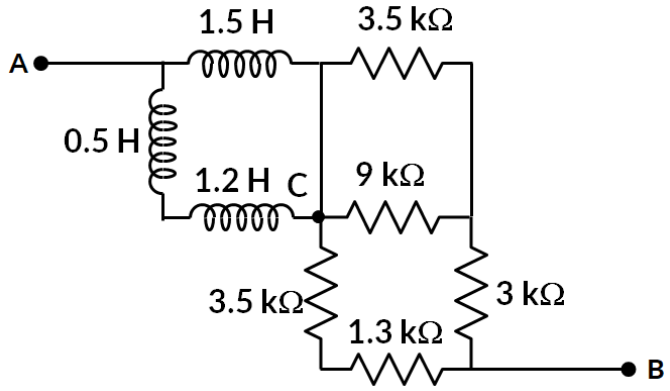

Fig. 4

---------- END OF QUESTIONS ----------

Answers:

1)

Fig. 1	$C_{eq} = \frac{(C_1 + C_2)C_3}{C_1 + C_2 + C_3}$
Fig. 2	2C
Fig. 3	4C
Fig. 4	C
Fig. 5	2.5 C
Fig. 6	2C

2) $(5.014 - j0.414)\Omega$

3) 6.25 mH

4) 1000 µC, 0.025 W

Filters:

1) $f_c = 32.98\ GHz |H(\omega)| = \frac{1}{\sqrt{1+2.38\times10^{-23}\omega^2}}$

2) $f_c = 5.47\ Hz, |H(\omega)| = \frac{1}{\sqrt{1+0.029\omega^2}}$

3) $f_c = 2.54\ Hz, |H(\omega)| = \frac{0.063\omega}{\sqrt{1+3.9\times10^{-3}\omega^2}}$

4) $f_c = 510\ Hz, |H(\omega)| = \frac{1}{\sqrt{1+0.097\times10^{-6}\omega^2}}$