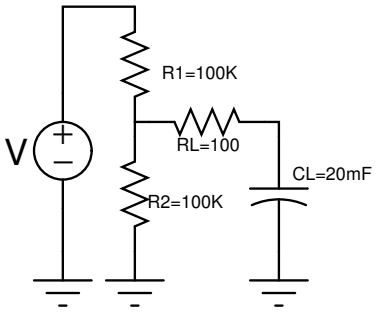

Figure 1: Noise with voltage source

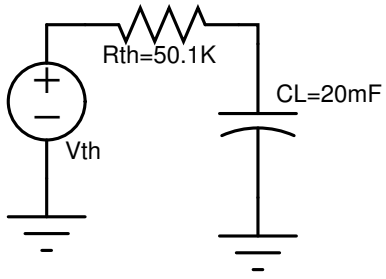

Figure 2: Thevenin Equivalent with load C_L

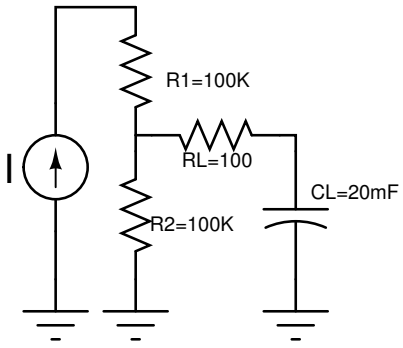

Figure 3: Noise with Current source

PSD of each resistor is given as
$S_{R1} = 4KTR_1 = 4 * 1.38 * 10^{-23} * 300 * 100K = 1.66 * 10^{15}\ V^2/Hz = S_{R2}$
$S_{RL} = 4 * 1.38 * 10^{-23} * 300 * 100 = 1.66 * 10^{18}\ V^2/Hz$
S_{total} [1] $= \frac{S_{R1}}{4} + \frac{S_{R2}}{4} + S_{RL} = 8.32 * 10^{-16}\ V^2/Hz$
Thevenin equivalent noise voltage density=$V_{th} = \sqrt{S_{total}} = 28.83n\ V/\sqrt{Hz}$
Thevenin resistance=R_{th}=100K$\|$100K+100=50.1K Ω
Output noise voltage density across $C_L = V_{OUT} = \frac{V_{th}}{1+j\omega R_{th} C_L} = 4.57 * 10^{-12} \angle -89.9\ V/\sqrt{Hz}$
Noise current throuh $C_L = V_{OUT} * j * \omega * C_L = 574 * 10^{-15} \angle 9.1m\ A/\sqrt{Hz}$

Spice code for setup 1 is given below

```
V1 1 0 AC 1 DC 5
R1 1 2 100K
R2 2 0 100K
RL 2 3 100
CL 3 0 0.02
.AC  DEC  8 1 100MEG
```

[1] CL is disconnected for calulating total PSD and for thevenin equivalent.

```
.NOISE V(3) V1 5
.PRINT NOISE ONOISE
.PROBE
.END
```

For measuring noise current

```
.NOISE V(3) V1 5
```

is replaced by statement

```
.NOISE I(C1) V1 5
```

Spice code for setup 3 is given below

```
I1 1 0 ac 100m dc 10m
R1 1 2 100K
R2 2 0 100K
RL 2 3 100
CL 3 0 0.02
.AC  DEC  8 1 100MEG
.NOISE I(CL) I1 5
.PRINT NOISE ONOISE
.PROBE
.END
```