Electronic circuits Assignment:

Experiments using LTspice

Submitted by:

Batch 11

Roopesh O R
Roshna Palatty Santhosh
Sadhnan Shameem Thappi
Sandeep S

November 2024

RC Low Pass Filter

Aim

To design a 2 stage RC low pass filter with cutoff frequency of 2KHz and plot its frequency response.

Design

Circuit

Frequency response

Result

Designed a 2 stage RC low pass filter. It's simulated cutoff frequency is found to be:

Zener Series Regulator

Aim

1. To design a 5V Zener series regulator for a input voltage of +8 to +20V and maximum load current of 50mA
2. Plot and its load regulation and line regulation and find percentage load regulation and line regulation.

Design

$I_L(max) = 50mA,\ I_L(min) = 10mA,\ I_Z(\text{max}) = 20mA,\ I_Z(min) = 10mA,\ V_Z = 5.1V$
$V_{in}(min) = 8V,\ V_{in}(max) = 20V$

$V_s(max) = V_{in}(max) - V_Z = 20V - 5.1V = 14.9V$

At minimum load current:

$$R_s max = \frac{V_s(max)}{I_L(min) + I_Z max} = \frac{14.9V}{10mA + 20mA} \approx 500\Omega$$

At maximum load current:

$$R_s min = \frac{V_s(max)}{I_L(max) + I_Z min} = \frac{14.9V}{50mA + 10mA} \approx 250\Omega$$

$$\therefore R_s = \sqrt{R_s max \times R_s min} = \sqrt{500 \times 250} = 353\Omega$$

Circuit

Load and line regulation

Result

Designed a 5V Zener series regulator and obtained its line regulation and load regulation.

Line regulation =

Load regulation =