Servando Olvera

CSE-3323-001

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Frequency Domain for RC Circuits

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequencies  Hz | Vout  V | Vin  V | [Vo/Vin]  V/V | 10log10|V0/VIN|^2  dB |
| 1 | 4 | 4 | 1 | 0 |
| 2 | 4 | 4 | 1 | 0 |
| 5 | 3.96 | 4 | 0.99 | -0.0873 |
| 10 | 3.68 | 4 | 0.92 | -0.72424 |
| 20 | 2.96 | 4 | 0.74 | -2.61537 |
| 50 | 1.62 | 4 | 0.405 | -7.8509 |
| 100 | 0.9 | 4 | 0.225 | -12.9563 |
| 200 | 0.5 | 4 | 0.125 | -18.0618 |
| 500 | 0.2 | 4 | 0.05 | -26.0206 |
| 1000 | 0.11 | 4 | 0.0275 | -31.2133 |

W0 = 1/RC = 141.84

F0 = 22.57

Atte (50 Hz and 100Hz) => 5.1

Atte (50 Hz and 100Hz) => 18.17

Time Domain and RC Circuits

|  |  |  |
| --- | --- | --- |
| Time  Sec | Charging  V | Discharging  V |
| 7.05 ms or (1τ) | 0.63 | 0.39 |
| 14.1 ms or (2τ) | 0.86 | 0.17 |
| 21.15 ms or (3τ) | 0.96 | 0.05 |

Time Constant τ = 7.05 ms

Part 2

AC Analysis

Attenuaiton at f0 = -3dB

Attenuation Difference between 50Hz and 100Hz (Octave)

-7.7dB – (-13.14dB) = 5.44 Hz

Attenuation Difference between 50Hz and 500Hz (Decade)

-7.7dB – (-26.9dB) = 19.2 Hz

Time Domain Analysis

Charging

1t = 630 mV

2t = 862.6 mV

3t = 949.2 mV

Discharging

1t = 370 mV

2t = 130 mV

3t = 51 mV

Part 4