**Filter design (Important questions)**

1. Derive the output impedance of the non-inverting opamp for (a) Finite gain (b) Infinite gain.
2. Derive the input impedance of the non-inverting opamp for (a) Finite gain (b) Infinite gain.
3. Derive the output impedance of the inverting opamp for (a) Finite gain (b) Infinite gain.
4. Derive the input impedance of the inverting opamp for (a) Finite gain (b) Infinite gain.
5. Discuss and derive the opamp models,
6. One pole Model
7. Integrator Model.
8. Build a circuit that adds the signal v1(t) = 3 cos(1.6 × 106)t multiplied by 1.9 and the signal v2(t) = -2 ė-5t multiplied by K2 = 2 to the dc voltage V3 = 4.5. All voltages are measured in volts [V] and the frequency is in rad/s. Will an LM741 opamp be adequate for the task? Assume ft = 1.5 MHz.
9. At which frequency does the magnitude of the system becomes zero dB?
10. Which unit is adopted for magnitude measurement in Bode plots?
11. Define first order filter of bilinear transfer function.
12. Create a bode plot for the bilinear transfer function
13. Describe types of filters with suitable diagram.
14. What are the advantages of Analog filters over digital filters?
15. Define insertion gain, insertion loss, attenuation and unit of gain.
16. The input voltage of a filter is V1(t) = and its output voltage is V2(t) = . At the applied frequency w, determine the gain in dB and the phase shift in degrees implemented by the filter.
17. Identify the filter type (lowpass, bandpass, etc.) describe by the following attenuation specification and calculate the widths of the transition of the bands.
18. αmax = 0.01 dB in f ≤ 3.4 kHz; αmin = 45 dB in 9.6 kHz ≤ f ≤ ∞.
19. αmax = 0.01 dB in 12.5 kHz ≤ f ≤ 24 kHz; αmin = 45 dB in f ≤ 7 kHz and f ≥ 40 kHz.
20. αmax = 85 dB in 12.5 kHz ≤ f ≤ 24 kHz; αmin = 1 dB in f ≤ 7 kHz and f ≥ 40 kHz.
21. αmax = 3 dB in 1 MHz ≤ f ≤ 2.4 MHz; αmin = 75 dB in f ≤ 730 kHz and αmin = 48 dB in f ≥ 7.8 MHz.
22. Compute magnitude, phase, pole and zero of T(s). Assume and . Where . Also plot magnitude and phase and identify the type of filter.
23. Use the procedure to find the output voltage V0 of the circuit in fig. 3.



1. The opamp circuit in Fig. is required to implement the function vo = v2 – 2v1.
2. Determine the values Ra and Rb that give the desired relationship.
3. Suppose that v2 = V2 = + 8 V and v1 = V1 = -8V; find the current in each resistor and power dissipated in each resistor.



1. Mention ideal characteristics of operational amplifier.
2. What is the physical significance of the slew rate of operational amplifier?
3. Describe switched capacitor active filter.
4. Write the short note on the followings
5. Allpass filter **b.** Second order lowpass filter **C.** Active and passive filters