



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

23ECB202/LINEAR INTEGRATED CIRCUITS

QUESTION BANK

1. What are all the important characteristics of ideal op-amp?

Ideal characteristics of OPAMP

1. Open loop gain infinite
2. Input impedance infinite
3. Output impedance low
4. Bandwidth infinite
5. Zero offset, ie, $V_o=0$ when $V_1=V_2=0$

2. Define CMRR of OP-AMP.

The relative sensitivity of an op-amp to a difference signal as compared to a common - mode signal is called the common -mode rejection ratio. It is expressed in decibels.

$$\text{CMRR} = A_d/A_c$$

3. Define slew rate.

The slew rate is defined as the maximum rate of change of output Voltage caused by a step input voltage. An ideal slew rate is infinite which means that op-amp's output voltage should change instantaneously in response to input step voltage.

4. Mention the advantages of integrated circuits over discrete components.

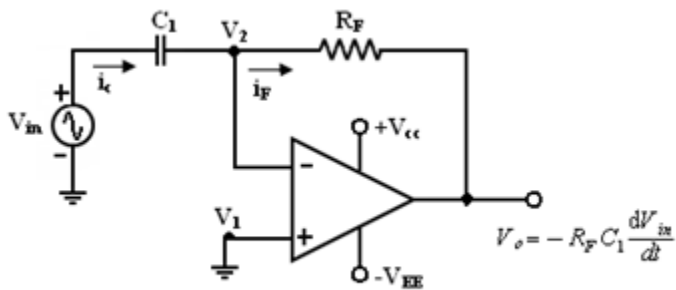
- *Miniaturisation and hence increased equipment density.
- *Cost reduction due to batch processing.
- *Increased system reliability due to the elimination of soldered joints.
- *Improved functional performance.
- *Matched devices.
- *Increased operating speeds.
- *Reduction in power consumption.

5. Define offset voltage of an Operational Amplifier.

A small voltage applied to the input terminals to make the output voltage as zero when the two input terminals are grounded is called input offset voltage.

UNIT 2 (2 MARKS)

1. Draw the circuit diagram of differentiator and give its output equation.



2. List the Important features of an instrumentation amplifier.

- High gain accuracy
- High CMRR
- High gain stability with low temperature coefficient
- Low output impedance

3. Why active guard drive is necessary for an instrumentation amplifier?

(i) Due to ground loop interference additional voltage drop gets inserted which may cause error in low level measurements.

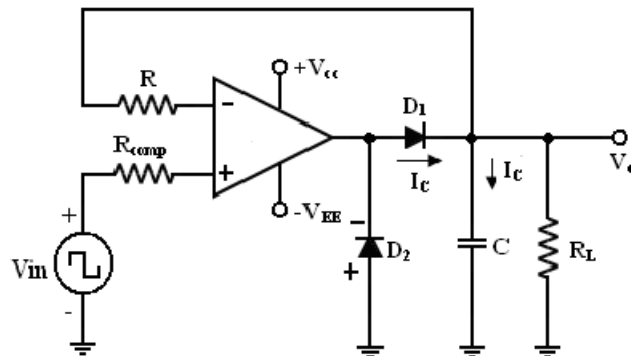
(ii) Due to distributed cable capacitances there is degradation of CMRR.

The active guard drive eliminates all these problems and necessary for an instrumentation amplifier.

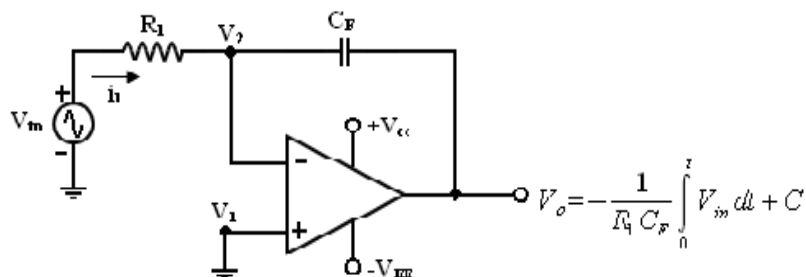
4. What is a voltage follower?

A circuit in which output follows the input is called voltage follower.

5. Draw the circuit diagram of peak detector.



6. Draw and write equation of an integrator using an op-amp.



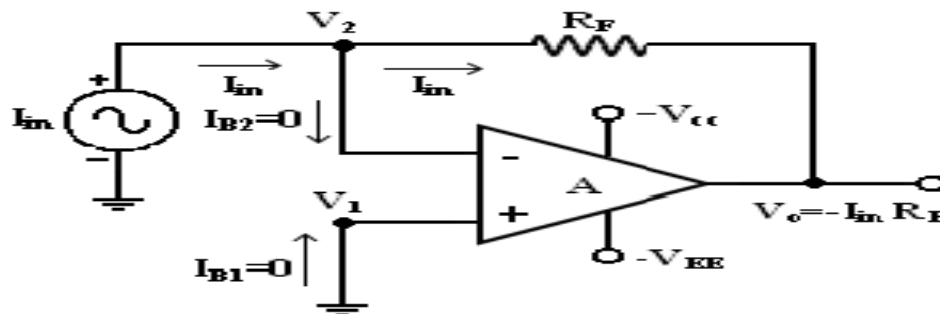
7. Why active guard drive is necessary for an instrumentation amplifier?

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(ii) Due to distributed cable capacitances there is degradation of CMRR.

The active guard drive eliminates all these problems and necessary for an instrumentation amplifier.

8. Give the schematic of op-amp based current to voltage converter.



At node V_2 , $V_1 = V_2 = 0$

$$I_{in} = -V_o / R$$

$$V_o = -I_{in} R, \quad V_o \propto I_{in}$$

9. Compare the performance of inverting and non-inverting operational amplifier configurations.

Inverting amplifier	Non inverting Amplifier
1. Gain = $-R_f / R_1$	1. Gain = $1 + (R_f / R_1)$
2. Input impedance is R_1	2. Input impedance very large
3. Gain adjusted as greater than, less than or equal to one.	3. Gain is always greater than one.
4. Output is inverted w.r.to input	4. No phase shift between input and output.

10. What are the applications of comparator?

1. Zero crossing detector
2. Window detector
3. Time marker generator
4. Phase detector