



## UNIT-I BASICS OF OPERATIONAL AMPLIFIERS

### 1. What do you mean by a band-gap referenced biasing circuit?

The biasing sources referenced to  $V_{BE}$  has a negative temperature coefficient and  $V_T$  has a positive temperature coefficient. Band gap reference circuit is one in which the output current is referenced to a composite voltage that is a weighted sum of  $V_{BE}$  and  $V_T$  so that by proper weighting, zero temperature coefficient can be achieved.

### 2. Define thermal drift.

The bias current, offset current & offset voltage change with temperature. A circuit carefully nulled at  $25^\circ\text{C}$  may not remain so when the temperature raises to  $35^\circ\text{C}$ . This is called thermal drift. Often, offset current drift is expressed in  $\text{nA}/^\circ\text{C}$  and offset voltage drift in  $\text{mV}/^\circ\text{C}$ .

### 3. Define supply voltage rejection ratio (SVRR)

The change in OPAMP's input offset voltage due to variations in supply voltage is called the supply voltage rejection ratio. It is also called Power Supply Rejection Ratio (PSRR) or Power Supply Sensitivity (PSS)

### 4. Define an operational amplifier.

An operational amplifier is a direct-coupled, high gain amplifier consisting of one or more differential amplifiers. By properly selecting the external components, it can be used to perform a variety of mathematical operations.

### 5. Mention the characteristics of an ideal op-amp.

- Open loop voltage gain is infinity.
- Input impedance is infinity.
- Output impedance is zero.
- Bandwidth is infinity.
- Zero offset.

### 6. Define input offset voltage.

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.

### 7. Define CMRR of an 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.  $\text{CMRR} = A_d/A_c$

### 8. What is frequency response of Op-amp?

The plot showing the variations in magnitude and phase angle of the gain due to change in frequency is called frequency response of Op-amp. The plot is used to find the bandwidth and cut-off



frequencies of Op-amp.

**9. Define Unity Gain Bandwidth of Op-amp.**

For a certain frequency of the input signal, the gain of the Op-amp reduces to 0 dB. This means  $20 \log |AOL(f)|$  is 0dB i.e.  $|AOL(f)| = 1$ . Such a frequency is called gain cross over frequency or unity gain bandwidth (UGB).

**10. 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 opamp's output voltage should change instantaneously in response to input step voltage.