

$$\text{Now } A_d = 125$$

$$A_{cm} = \frac{A_d}{1000} = \frac{125}{1000} = 0.125$$

Hence the common mode output is

$$= A_{cm} V_{cm} = 0.125(4 \sin 200\pi t) = 0.5 \sin(200\pi t)V$$

TWO MARK QUESTIONS AND ANSWERS

1. Define Diffusion Resistance.

The resistance r_π is called the diffusion resistance or base emitter input resistance.

$$r_\pi = \frac{v_{be}}{i_b} = \frac{V_T}{I_{BQ}} = \frac{\beta V_T}{I_{CQ}}$$

2. What is transconductance?

The parameter g_m is called a transconductance.

$$g_m = \frac{I_{CQ}}{V_T}$$

3. What is loading effect?

1. In CE amplifier, input resistance is not much higher than signal source resistance. Due to this, actual input voltage to the amplifier is reduced. This is called loading effect.

2. To minimize loading effect, $R_i \gg R_s$.

4. Explain the meaning of voltage swing limitations.

In a linear amplification process, when symmetrical sinusoidal signals are applied to the input of an amplifier, we get amplified sinusoidal signals at the output. It is possible to obtain maximum output symmetrical swing that amplifier can provide using an a.c load line. If the output exceeds the limit, a portion of the output signal will be clipped resulting signal distortion.

5. What is differential amplifier? What is differential and common mode gain of differential amplifier?

An amplifier which amplifies the difference between the two input voltage signals is called differential amplifier.

The gain with which differential amplifier amplifies the difference between two input signals is called differential gain denoted as A_d .

$$A_d = \frac{V_o}{V_d}$$

The gain with which it amplifies the common mode signal to produce the output is called common mode gain denoted as A_{cm} .

$$A_{cm} = \frac{V_o}{V_{cm}}$$

6. Define CMRR and state its expression.

The ability of a differential amplifier to reject a common mode signal is expressed by a ratio called common mode rejection ratio(CMRR).It is defined as the ratio of differential voltage gain to common mode voltage gain.

$$CMRR = \left| \frac{A_d}{A_{cm}} \right|$$

7.What is Darlington Amplifier?

The cascaded connection of two emitter followers is called Darlington connection. It improves current gain and increases input impedance.

8.State the advantages of Darlington connection.

1. It increases input impedance.
2. It increases current gain.

9. What do you meant by multistage amplifier?

When the input or output impedance is not of the correct magnitude, for a particular application, two or more amplifier stages are connected, in cascade. Such amplifier with two or more stages is known as multistage amplifier.

10.What is the need of multistage amplifier?

For faithful amplification, amplifier should have desired voltage gain, current gain and it should match its input impedance with source and output impedance with load. Many times, these primary requirements of amplifier cannot be achieved with single stage amplifier, because of the limitation of transistor/FET parameters. In such situation, multistage amplifiers are needed which provides impedance matching requirements with some amplification.

11.State the features of multistage amplifier.

1. It provides high input impedance.
2. It provides high voltage gain.
3. It provides very high output resistance.
4. It also provides high slew rate and high stability.
5. It provides improved input-output isolation.

12. What is the need for differential amplifier?

Whenever it is necessary to amplify the difference between the two signals and eliminate the effect of common mode signals such as unwanted interference and noise, the differential amplifier is necessary.

13. State the various features of differential amplifier.

1. High differential voltage gain.
2. Low common mode gain.
3. High CMRR.
4. High input impedance.
5. Large Bandwidth.
6. Low output impedance.
7. Low offset voltages and currents.

14. What are the techniques to improve input impedance?

The input impedance can be increased using two techniques:

1. Using direct coupling (Darlington connection)
2. Using Bootstrap technique.

15. State the limitations of multistage amplifier.

1. The bandwidth of multistage amplifier is always less than that of the bandwidth of single stage amplifier.
2. Nonlinear distortion is more in multistage amplifiers than single stage amplifiers.

16. What is A.C load line?

When capacitors are included in a transistor circuit, a new effective load line called an a.c load line exist. It gives the relationship between the small signal response and the transistor characteristics.

17. What does bootstrapping mean?

In the emitter follower amplifier, A_v is 1. If a resistor is connected between input and output, the change in voltage at one end of the resistor changes the voltage at other end of resistor by same value. It is resistor is pulling itself up by its bootstraps. Such effect is known as bootstrapping.