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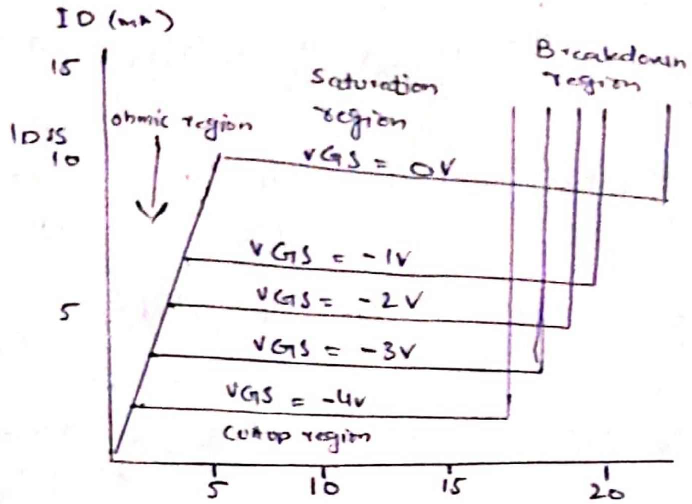
Q:-1 Explain the trans conductance curve for n-channel JFET given below . figure.

Ans The transconductance curve of JFET transister is the graph of the drain current , ID verses the gate source voltage , VGS. The ratio of change in ΔID , to the change in ΔVGS. is the transconductance gm. and unit of transconductance is siemens (S) while reciprocal of resistance (Ω) . The transconductance curve as for all semiconductor devices, is non linear, for most of the curve , meaning changes to VGS do not directly increase or decrease ID. Below are the transconductance curves of N-channel JFET & P-channel JFET transisters.



N- Channel JFET Characteristic Curve

(a) Cuttoff Region:- This is the region where JFET transistor is off, meaning drain current, ID flows from drain to source.

(b) Ohmic Region :- At This region the JFET resistors show some resistence to ID from ~~ID~~ drain to source drain current is begining The responce is linear at this curve.

(c) Saturation Region:- During This region, JFET is on and off. At this region the JFE transistor is have maximum current and fully operation and VGS is supplied is flowing.

(i) Breakdown Region:- At this region the voltage VDD is supplied to drain of transister exceeds the necessary maximum. The transister is breakdown and the current flows from drain to source because at this stage the JFET loses its capicity to resist current because high voltage is applied accross its drain-source terminals.

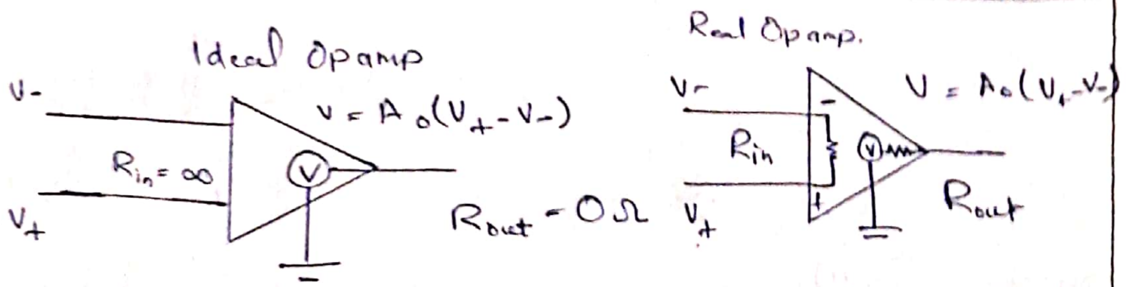
Q.2 State characteristics of Practicle Operation amplifier?

Ans Practical Op-Amp :-

Characteristics:-

1. High input impedence
2. Very low output impedence
3. High voltage gain.
4. It has both voltage and current limitations

The practical Op Amplifier characteristics can be approximated closely enough, for many practical op. Amp But basically the practical op-Amp characteristics are little bit different than ideal op-amp characteristics.



Bandwidth: The bandwidth of practical op. amp is very small in open loop. By application of negative feedback it can be increased to a desired value.

Output impedence:- With the help of negative feedback it can be reduced to a very small value like 1 or 2 ohms. It is typically few hundreds ohms.

Input Impedence: It is typically greater than 1 M Ω. and finite for the input stage using FET it can be increased upto several hundred M.

Open loop Gain: It is the voltage gain of OP Amplifier when no feedback is practically it is several thousands.

Input offset voltage:- The output voltage should be zero if both input terminals are gr. earth or grounded. ideally, at this stage non-zero small voltage shown by practical OP-amp small voltage in millivolts is required to be apply to one of input such a voltage makes output voltage zero. The grounded terminal is called input offset voltage donated as V ios. The input offset voltage depends on the temperature.

Input Bias Current:- For ideal op-amp, no current flow into input The practical op-amp do have some input currents which are very small, of the order of 10-6A to 10-14 A. Most of op-amp use differential amplifier as input stage. The two transistors.

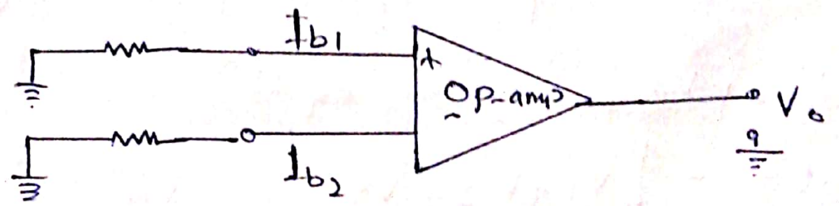
of differrent amplifier must be baised correctly But practically, it is not possible to get exact matching of two transisters. Thus the two transistors, do conduct the small d.c current. So input bias current can be defined as current flowing into each of the two input terminals when they are baised to same voltage level i.e when the op-amp is balanced. The two input current, ~~ar~~. when op-amplifier is balanced are shown. The two input currents, are never same. hance the manufacture specify the average input bias current Ib, which is found by adding the magnitudes of Ib1 and Ib2 and dividing the sum by 2.

Mathematically:- $I_b = \frac{|I_{b_1}| + |I_{b_2}|}{2}$

Input offset current :- The difference in magnitudes of Ibi Ib2 is called as input offset current and is denoted as IQ thus,

$$I_{ios} = | I_{bi} - I_{b2} |$$

The magnitude of this current is very small of order of 20 to 60nA. it is measured under the condition that input voltage to op-amp is zero. If we supply equal d.c current to two inputs, output voltage of op-amp must be zero. But practically, there exist some voltage at the output. To make it zero, the two input currents are made to differ by small amount. This difference is nothing but input offset current.



Input Bias Current.

Q: 3 Calculat output voltage for summing amplifier if $V_1 = 0.2V$, $V_2 = 0.5V$ & $V_3 = 2V$ & $R_1 = R_2 = R_3 = R_f = 6k\Omega$.

Ans: To Find voltage for summing amplifier

Solution:- according to ohm law.

$$V = IR$$

$V_1 = I_1 R_1$

So, $I_1 = V_1 / R_1$

$I_2 = V_2 / R_2$

$I_3 = V_3 / R_3$

Putting values in eq ③

$$V_{out} = -\left[V_1/R_1 + V_2/R_2 + V_3/R_3 \right] R_F \text{ ---- eq ④}$$

When three resistors are equal Then

i.e $R_1 = R_2 = R_3 = R_f = R$

$$V_{out} = -\left[V_1/R + V_2/R + V_3/R \right] R$$

$$V_{out} = -\left[V_1 + V_2 + V_3 \right] \text{ --- eq ⑤}$$

~~[V1 + V2 + V3] ---- eq ⑤~~

$$V_{out} = -\left[V_1 + V_2 + V_3 \text{ ---} V_n \right]$$

So putting value in eq.

$V_{out} = -[V_1/R + V_2/R + V_3/R]R$

$V_{out} = -[0.2/6 + 0.5/6 + 2/6]6$

$V_{out} =$.

Q:No 4(a) You are working on an audio circuit in lab which class of amplifier will you not consider for your work?

Ans ① They are commonly used in RF circuits.

② Class C amplifiers are quite efficient

③ However, the RF circuits were class C amplifiers are used, ~~emp~~ employ filtering so that final signal is completely acceptable.

④ Class C amplifier are never used for audio circuits

⑤ Class C amplifiers operat the output transister in a state that results in tremendous distortion.

Reason:- Output devices conduct for less than 180 degrees (100 to 150) degrees typically) - Radio.

Frequency only. cannot be used for audio! This is Sound heard when one of the output device goes open circuit in an audio amplifier. below figure shows time output device conduct.

Q.No 4 (b) Outline differences between an amplifier & a Rectifier.

~~Ans~~

Ans (b) Amplifier:- An electronic device that increase or boosts voltage, current or power of a signal.

Application:- Audio amplifiers, hearing aids, music System, Operational amplifier.

Rectifier:- The function of rectifier is to convert incoming AC signal from transformer or other AC power source to some form of Pulsating Dc.

Application:- The primary application of rectifier is to derive DC power from

an AC supply (AC to DC coverter)
Rectifiers are used inside. The power supplies of vitually all electronic Equipment
Uses:- It convert AC to DC,
a this method is knows as rectification.
It is used as components of power supplies and as a detectors of radio signal,
Rectifiers may be made of solid state diodes, vaccum tube diodes, mercury arc valves and other tecnologies