Amplifier project class 12 pdf

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Binding rye is formed by placing a Type P crystal in contact with P-type crystal and subjected to high pressure to become a single piece. The assembly obtained is called binding diode or glass diode or p-n junction. The contact surface of glass type p and n is called binding. During the formation of a binding diode, holes in the p region are disseminated in region n and the electron of region n is disseminated in region P. In both cases, when an electron encounters a hole, they cancel the effect of each other and, as a result, a thin layer at the junction is free of any of the cargo carriers. This is called exhaustion layer. The thickness of the exhaustion layer is in the order of 10-6 m. A binding diode used for amplification is known as transistor. There are three sections of transistor. i) Issuer (F) ii) Base (B) iii) Collector (c) The base (B) of a transistor becomes thin and lightly dyed. The sender (E) supplies most carriers for the current flow and the collector (C) to collect them. When using a transistor on a circuit, the union of base emiters is always skewed forward and the base-collector union is skewed. Transistors are of two types i) p-n-p transistor ii) n-p-n transistor i) p-n-p transistor is formed when section n is changed between two sections p. ii) the n-p-n transistor is formed when section p is changed between two n-sections. The fig. shows the appropriate bias of an NPN transistor. The n-type transmitter is biased forward by connecting it to a negative pole of the Vee battery and the n-type collector is skewed by connecting it to the positive pole of the Vcc battery. The base contains a small No. holes, due to this combination of electron holes in the base region is very small. Most electrons (95%) swept away by the collector and enters the positive pole of the Vcc collector base battery, an electron enters emitting from the negative pole of the Vcc base battery So the current is carried inside the transistor, as well as external circuit for electrons. If that is, Ib and Ic are respectively the current emitter, base current and collector current then Ie = Ib + Ic PNP transistor action : The action of both types of transistors i.e. npn and pnp is similar except that most and minority carriers in both cases are of opposite nature. An amplifier is a device that is used to increase the amplitude of the alternating voltage variation or current or power. The amplifier thus produces an extended version of the input signal. These are two input terminals for the signal to be amplified and two output terminals to connect the load and an average of energy to the amplifier. Amplifier Type : i) Common Base Amplifier ii) Common Base Amplifier Common Base Amplifier In Common Base Amplifier, Transistor Transistor Base Base Amplifier common to the issuer and collector. a) Circuit amplifier by transistor n-p-n - 1 The common base amplifier circuit using npn transistor. The base is common both at the entrance and on the exit circuits. The transmitter is skewed forward by using the Vce emitter base battery and due to this input circuit resistance is small. The collector is skewed inversely by using the Vce collector base battery and, as a result, the output resistance is quite large. The input voltage is applied through the base circuit of the transmitter and the amplified output is obtained through the collector and the base. If that is, if that is, Ic be current issuer, base and collector then IE = Ib + Ic In accordance with the law Kirchhaffis Si Ic running on collector's circuit, Ic RL potential fall then. Vcb = Vcc - ICRL b) Circuit amplifier using pnp transistor Fig. displays the common base amplifier circuit using pnp circuit. The basic theory of this circuit is the same as in the NPN transistor. The output voltage obtained through the collector is in the phase with input voltage. The average input voltage cycle increases the emitter's forward bias. This will increase the issuing current and collector stream. Increase the collector's stream and collector's stream. Increasing the collector stream will increase the potential drop through RL, therefore decreasing collector tension. Decrease means that it will become less negative, that is, there will be positive tension of the output signal. Similarly, during the negative voltage of the mid-cycle output signal will occur. It is the ratio of output current to the input current Let Ic = Current output Ie = Current input Current gain = = POWER GAIN : It is the ratio of output power to input power. Power gain = = Current gain x Voltage gain = a x We have read about the configurations in which the transistor can be connected; that is, CB, CC and CE, the bias of the E-B and B-C union, and the regions of operations; that is, the cut, the active region and the saturation region. We also know that the transistor when used in cutting or saturation state, acts as a switch and then operates in the active region is used as an amplifier. In this article, we will learn how to use a transistor as a switch and as an amplifier, in detail. Transistor as a switch When using a transistor as a switch, there are two operating regions, and they are saturation region where the transistor is fully switched on and the cutting region where the transistor is completely turned off. This also means that the current base IB is zero and the current IC collector is also zero. When these currents are zero, the voltage of the VCE collector which results in a large layer of exhaustion. Saturation region in this region base current, IB is applied to the transistor and the maximum current is obtained from the collector, IC. Since the current is maximum, the voltage in the collector would be minimal. Therefore, in this condition, the transistor is said to be full. We consider a biased base transistor in the CE configuration, as shown in the figure. As we apply Kirchhoff's tension law next to the entrance and next to the exit of the circuit, we can write, \(V_{BB}=I_{B}R_{B}+V_{BE}\\ \\V_{CE}=V_{CC}-I_{C}R_{C}\) Here VBB is the DC input voltage and VCE is the dc output voltage. , we can type it as, \(V_{i}=I_{B}R_{B}+V_{BE}\\ \\V_{0}=V_{CC}-I_{C}R_{C}\) Now, we'll see how V0 changes as we increase wine. In the case of a si-transistor, Note that as long as the input voltage is less than 0.6 V, the transistor remains in the cutting state and current that I am zero, and therefore we can type, \(V_{0}=V_{CC}\) And when the Vi input voltage is greater than 0.6 V the transistor remains in its active state and the current Ic is obtained in the output path. In addition, output voltage V0 decreases as we increase \(I_{C}R_{C}\). Here, as long as the Wine is low and unable to anticipate the transistor bias, the value of V0 is high. As soon as the value of Wine becomes high enough for the transistor to reach a saturation state, the value of V0 decreases to a very low value, which is almost equal to zero. When this transistor is in a state where it is not conductive, it acts as a switch in its state of departure and when it is in its saturation state, it acts as a switch in its state. Transistor applications as a switch Below is the list of transistor applications as a switch: LED operation is the most common example of a transistor as a switch. The operation of dc engines is controlled by the application of different values at the speed of the engine that is used even more to turn the engine on and off. Light-dependent resistance uses transistors as a switch. Transistor as an amplifier As we have seen before, a transistor in its active state acts as an amplifier, which is located in the active region of the curve between V0 and Wine. In this curve, the slope of the linear part represents the speed at which the signal output changes with respect to the signal input. We can say that the speed is negative, since the output is not only \(I_{C}R_{C}\) but \(V_{CC}-I_{C}R_{C}\), so as we increase the input voltage of the CE amplifier, the output voltage decreases. Here, the output is out of phase with the input signal. Now, if we write the small changes in output voltage and input voltages such as ΔVo and ΔVi then the ratio of the output signal to the input signal gives the gain in the signal. We can type, \(V_{0}=V_{CC}-I_{C}R_{C}\) Therefore, we can type, \(\Delta \(\Delta I_{C}\) As we also have, \(V_{i}=I_{B}R_{B}+V_{BE}\) Therefore, we can also write, \(\Delta V_{i}=R_{B}\Delta I_{B}+\Delta V_{BE}\) But \(\Delta V_{BE}\) is insignificantly small compared to \(\Delta I_{B}R_{B}\) on this circuit. Therefore, the voltage gain of this CE amplifier is given by \(A_{v}=-\frac{R_{C}\Delta I_{C}}{R_{B}\Delta I_{B}}=-beta _{ac}\frac{R_{C}}{R_{B}}\) Here, βac can be given as, \(\beta _{ac}=\frac{\Delta I_{C}}{\Delta I_{B}}\) We can conclude that the linear part of the active region of the aforementioned curve can be used as an amplifier. Amplifier performance We know that the most preferred connection mode is common sender mode. When a transistor is used as an amplifier, the performance of the amplifier becomes important. Below are the terms used to describe the performance of the amplifier: Input resistance The input resistance would be low as the input circuit is biased forward. This is the resistance offered by the base union of emitrs to signal flow. Input resistance is defined as the ratio of small change in the base voltage of issuer to the change in the base current when the transmitter-collector voltage remains constant. Output resistance The resistance to the output of the transistor as an amplifier would be very high. Output resistance is defined as the relationship of change in the transmitter-collector voltage to the change in the current of the collector when the base current is constant. The current gain is defined as the ratio of change in the collector's stream to the change in the base stream. The value of the current gain can vary from 20 to 500. The voltage gain is defined as the exchange ratio in the output voltage to the change in the input voltage. Power gain The power ratio of the output signal to the input signal power is known as energy gain. Application of the transistor as an amplifier The main application of the transistor as an amplifier is in the field of electronics and communication. Below is the list of these applications: Transistor as amplifier is used in fiber optic communication. Since the intensity of the output signal is high, it is applicable in long distance communication. Amplification of radio signals is possible due to these amplifiers. Amplifiers are used in wireless communication. Audio amplification is possible due to the use of amplifiers. Stay tuned to BYJU'S for more information about how transistors can be used as a switch and amplifier, transistor actions, switch types, and other related topics. Themes.