# PHYSICS

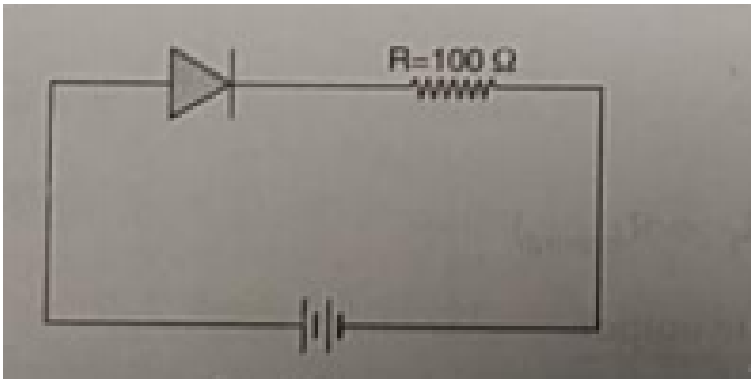
# BOOKS - MODERN PUBLICATION

# SEMICONDUCTOR DEVICES

## Example

**1.** Figure Shows a diode connected to an external resistance and an e.m.f. Assuming that the barrier potential developed in diode

is 0.5 V, obtain the value of current in the circuit in milliampere.

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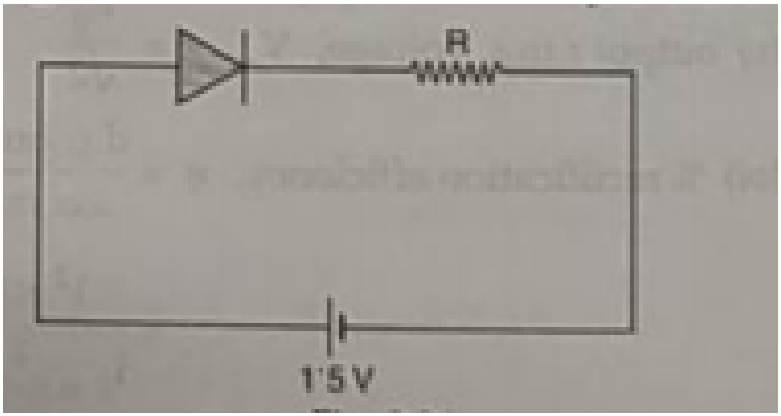
**2.** The diode used in the circuit shown in the adjacent figure has a constant voltage drop of 0.5V at all currents and a maximum power rating of 100mW.What should be the value of

resistor R connected in series with the diode for obtaining maximum current?

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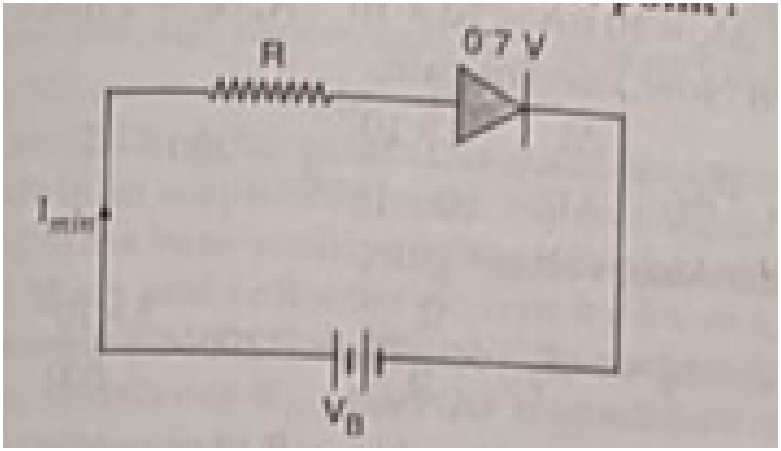
**3.** Assume that the silicon diode in the circui shown in fig. requires a minimum current of 1mA to be above the knee point (0.7V) of its I-V

characteristics. Aslo assume that the voltage across the diode is independent of current above the knee point.

If $V_B = 5\text{V}$, what should be the maximum value of R so that the voltage is above the knee point?

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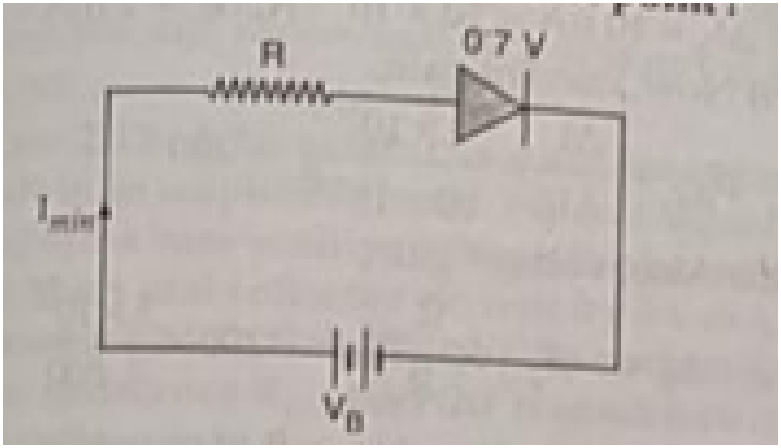
**4.** Assume that the silicon diode in the circui shown in fig. requires a minimum current of 1mA to be above the knee point (0.7V) of its I-V characteristics. Aslo assume that the voltage across the diode is independent of current above the knee point.

If $V_B = 5V$, what should be the value of R to estabilish the current of 5mA in the circuit?



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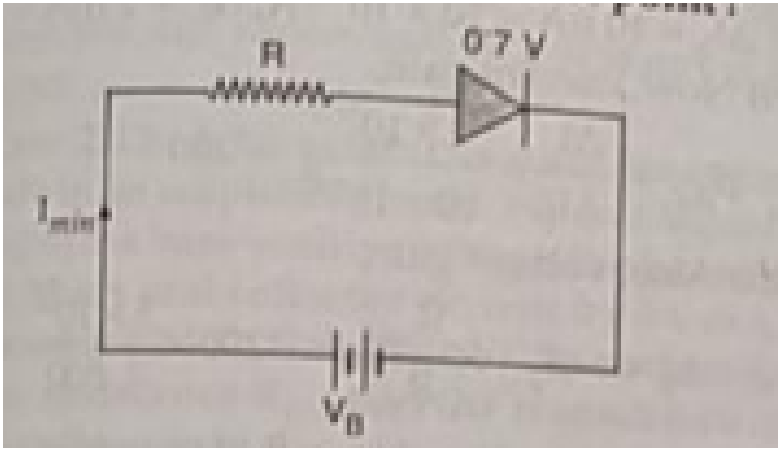
**5.** Assume that the silicon diode in the circui shown in fig. requires a minimum current of 1mA to be above the knee point (0.7V) of its I-V characteristics. Aslo assume that the voltage across the diode is independent of current above the knee point.

What is the power dissipated in the resistance R and in the diode, when a current of 5mA

flows in the circuit at $V_B = 6V$?

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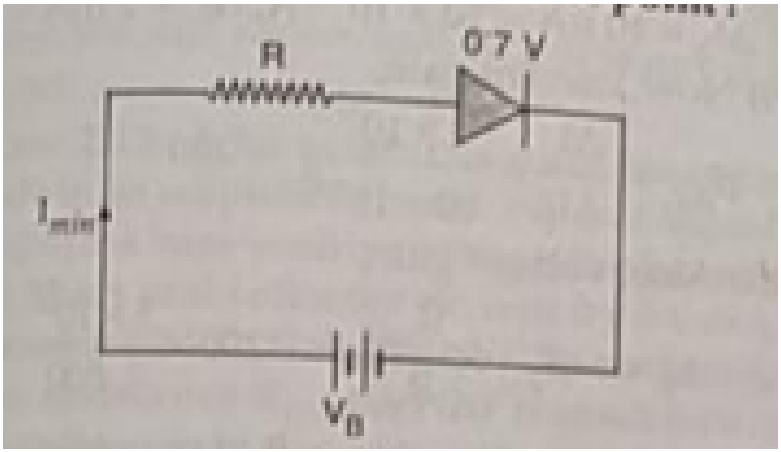
**6.** Assume that the silicon diode in the circui shown in fig. requires a minimum current of 1mA to be above the knee point (0.7V) of its I-V characteristics. Aslo assume that the voltage

across the diode is independent of current above the knee point.

If $R = 1k\Omega$, what is the minimum voltage$V_B$ required to keep the diode above the knee point?

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**7.** In a half wave rectifier, a p-n junction diode with internal resistance 20 ohm is used. If the load resistance of 2 kiloohm is used in the circuit, then find the efficiency of this half wave rectifier.

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**8.** For a transitor working as common base amplifer, current gain is 0.96. If the emitter current is 7.2 mA, calculate the base current.

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**9.** For a common emitter amplifier , current gain is 70 . If the emitter is 8.8 mA , calculate the collector and base current . Also calculate current gain , when transistor is worked on common base amplifier.

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**10.** The base current of a transistor is $105\mu A$ and collector current is 2.05mA.

Determine the value of $\beta, I_e$ and$\alpha$

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**11.** A change of $20\mu A$ in the base current produces a change of 0.5mA in the collector current. Calculate $\beta_{ac}$

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**12.** In a silicon transistor, a change of 7.79 mA in the emitter current produces a change of

7.7 mA in the collector current. What change in the base current is necessary to produce an equivalent change in the collector current?

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**13.** For a transistor amplifier, the collecor load resistance $R_L = 2kohm$ and the input resistance $R_i = 1kohm$ . If the current gain is 50, calculate voltage gain of the amplifier.

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**14.** In a silicon transistor, the base current is changed by $20\mu A$. This results in a change of 0.02 V in base to emitter voltage and a change of 2mA in the collector current.

Find the input resistance, $\beta_{ac}$ and transconductance of the transistor $g_m$.

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**15.** In a silicon transistor, the base current is changed by $20\mu A$. This results in a change of 0.02 V in base to emitter voltage and a change

of 2mA in the collector current.

This transistor is used as an amplifier in CE configuration with load resistance $5k\Omega$. What is the voltage gain of the amplifier.

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**16.** The input resistance of a silicon transistor is $665\Omega$ when base current is changed by $15\mu A$, the collector current changes by 2mA. In a common emitter amplifier load resistance

is $5k\Omega$. Calculate transconductance $(g_m)$ & voltage gain $(A_v)$ of the amplifier.

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**17.** A transistor is used in common emitter mode in an amplifier circuit.When a signal of 24 mV (millivolt) is added to base emitter voltage, the base current changes by $32\mu A$ (micro ampere) and collector current by 3.6 mA (milli ampere) and the load resistance is

$4.8k\Omega$ (kilo ohm). Calculate trans conductance

$g_m$

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**18.** A transistor is used in common emitter mode in an amplifier circuit.When a signal of 24 mV (millivolt) is added to base emitter voltage, the base current changes by $32\mu A$ (micro ampere) and collector current by 3.6 mA (milli ampere) and the load resistance is $4.8k\Omega$ (kilo ohm). Calculate voltage gain.

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**19.** In the circuit Fig. the value of beta is 200. Find $I_B, V_{CE}, V_{BE}$ and $V_{BC}$, when $I_C = 2.5mA$. The transistor is in active, cut off or saturation state.

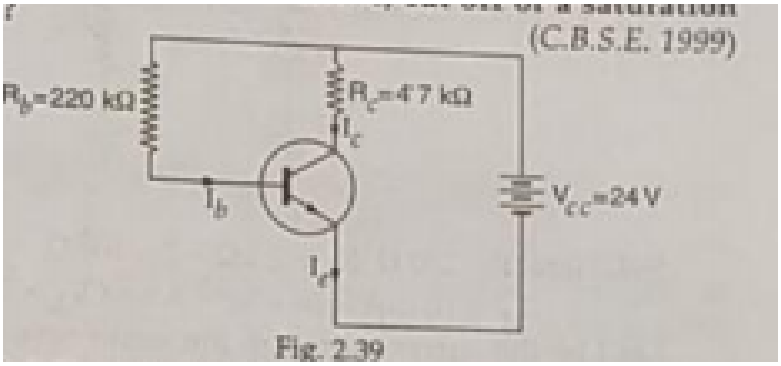

Fig. 2.39

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**20.** A potential barrier of 0.3 V exists across a P-N junction: If the depletion region is $3 \times 10^{-7}$ m wide , what is the intensity of the electric field in this region?

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**21.** A potential barrier of 0.3 V exists across a P-N junction: If an electron with speed $4 \times 10^{5} ms^{-1}$ approaches this P-N junction from the N-side, the find the speed with which

it will enter the P-side. Given mass of electron $9.1 \times 10^{-31} kg$

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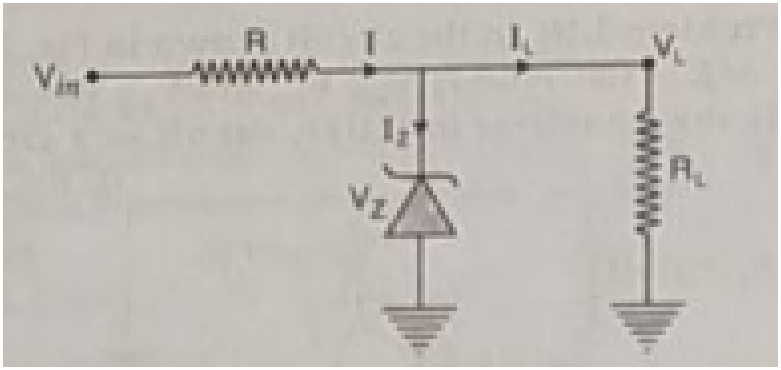
**22.** In figure what is the voltage needed to maintain 15V across the load resistance $R_L$ of 2K, assuming that the series resistance R is $200\Omega$ and the zener requires a minimum current of 10mA to work satisfactorily? What is

the zener rating required?

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**23.** In a p-n-p transistor circuit, the collector current is 10mA , If 90% of the electrons emitted reach the collector , what is base current ?

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**24.** A n-p-n transistor is connected in common emitter configuration in which collector supply is 9V and the voltage drop across the load resistance of $700\Omega$ connected to the collector circuit is 0.7V. If the current amplification factor alpha is $25/26,$ determine collector emitter voltage and base current. If the input resistance of the transistor is $100\Omega,$ calculate the voltage gain and the power gain.

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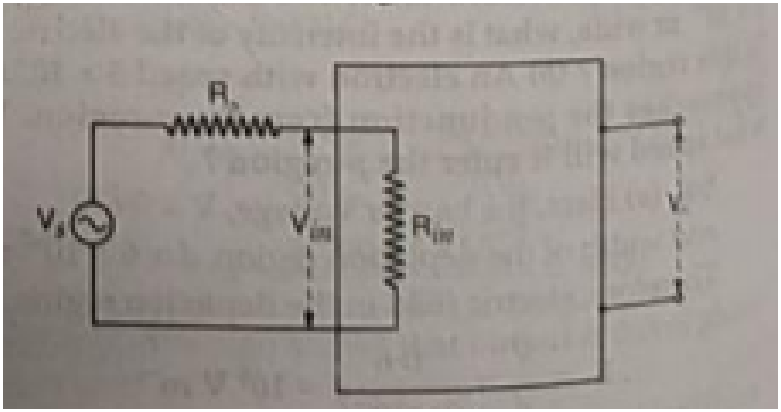
**25.** An amplifier is represented by the circuit shown in Fig. Here $r_i$ is the input resistance of the amplifier and the voltage $V_i$ is appearing across it. This voltage is amplified by a factor $A_V$ and appears across the load as voltage$V_0$ An external voltage V_(s) is applied at the input terminals of the amplifier via series resistance R_(S). What will be the apparent gain $A_V( = V_0 / V_s)$ of the ampilifier in terms

of $A_V$, $R_S$ and $r_i$.

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**26.** What do you understand by potential barrier?

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**27.** Explain how the width of depletion layer in p-n junction diode changes when the junction is

reverse biased.

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**28.** Can the potential barrier across a p-n junction be measured by simply connecting a voltmeter across the junction?

Watch Video Solution

**29.** What do you mean by depletion region in a p-n junction ?

Watch Video Solution

**30.** How does the junction width change when a p-n junction is forward biased?

Watch Video Solution

**31.** What is the effect of forward biasing on the resistance of a p-n junction?

Watch Video Solution

**32.** Which type of biasing gives a semiconductros diode vary high resistance?

Watch Video Solution

**33.** Fill in the blanks:

When a p -n junction is forward biased, then the motion of charge carriers across the barrier is due to ..... (drift, diffusion) and when it is reverse biased, then the motion of charge carriers is due to..... (drift, diffusion).

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**34.** Fill in the blanks:

An ideal p-n junction diode conducts, when

_____ biased and does not conduct, when ..... Biased. (Forward, reverse)

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**35.** Draw a circuit diagram with a p-n junction in forward bias.

Watch Video Solution

**36.** Draw a circuit diagram with a p-n junction atreverse bias.

Watch Video Solution

**37.** In the figure is the diode D forward or reverse biased?


Watch Video Solution

**38.** In the figure is the diode D forward or reverse biased?


Watch Video Solution

**39.** Under what condition does a junction diode work as open switch?

Watch Video Solution

**40.** Wha tis a zener diode? How is it symbollically represented? With the help of a

circuit diagram, explain the use of zener diode as a voltage stabilizer

Watch Video Solution

**41.** How reverse current suddenly increases at the break down voltage in case of a junction diode?

Watch Video Solution

**42.** What is Zener breakdown?

Watch Video Solution

**43.** Draw the

symbol and

the reverse bias I-V characterstics of a zener diode. Explain briefly, which property of the characterstics enables us to use zener diode as voltage regulator.

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**44.** Write in brief about Photo-diodes.

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**45.** How is the band gap $E_g$ of a photodiode related to the maximum wavelength $\lambda_m$ that can be detected by it?

Watch Video Solution

**46.** Draw a circuit diagram to show how a photodiode is biased.

Watch Video Solution

**47.** What is light emitting diode (LED)?

Watch Video Solution

**48.** State the factors, which controls wavelength of light, emitted by a LED.

Watch Video Solution

**49.** State the factors, which controls wavelength of light, emitted by a LED.

Watch Video Solution

**50.** Name the diode for which the output voltage is a regulated voltage.

Watch Video Solution

**51.** Name the diode that emits spontananeous radiation, when forward biaed.

Watch Video Solution

**52.** What is a solar cell?What is its working principle?Write short note on the makingof solarcells and also give its uses.

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**53.** Write the full form of transistor.

Watch Video Solution

**54.** Why transistor is so called?

Watch Video Solution

**55.** How P-N-P and N-P-N transistor are represented symbollically?

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**56.** Can two P-N junction diodes back to back works as P-N-P transistor?

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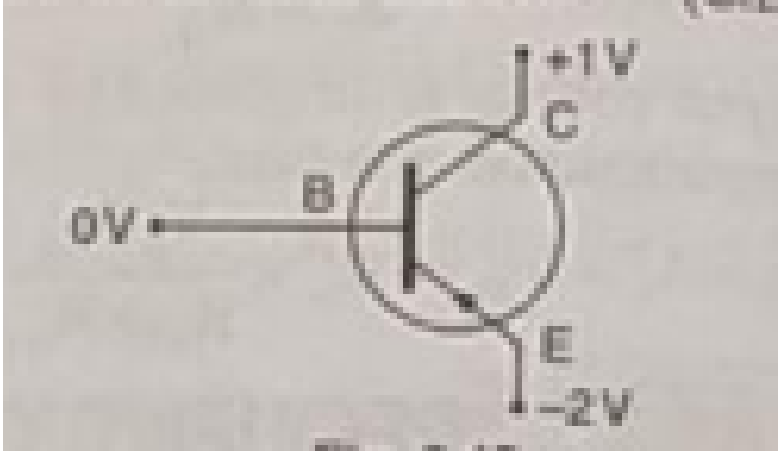
**57.** In the figure the collector forward or reverse biased?

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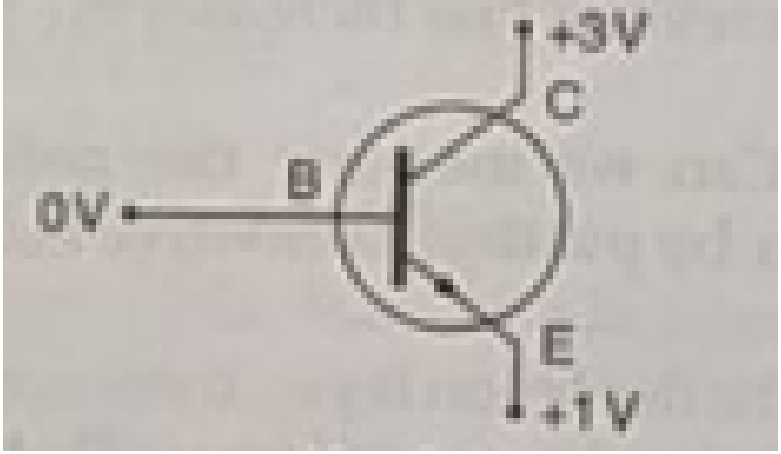
**58.** In the figure the emitter forward bias or reverse bias?

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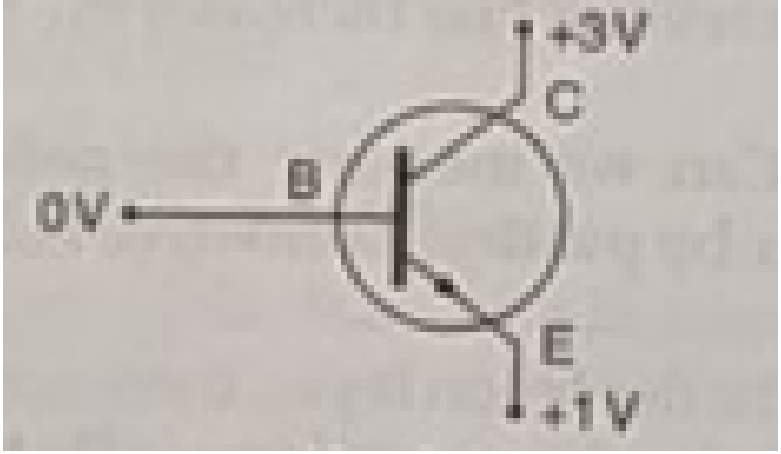
**59.** In the figure the collector forward or reverse biased?

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**60.** What is the relation among emitter current $(I_E)$ collector current $(I_C)$ and base current $(I_B)$ for a transistor circuit? Which one of the three has the smallest magnitude?

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**61.** Fill in the blanks: The base of trasistor is always ..... and ..... doped, compared to the emitter and collector. (thinner, thicker, lightly, heavily)

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**62.** Fill in the blanks: For using a transistor as an amplifier, the base emitter junction is ..... Biased and the base collector junction

is ..... biased. (forward, reverse, forward, reverse)

Watch Video Solution

**63.** Define input resistance of a transistor used in its common emitter configuration.

Watch Video Solution

**64.** Define d.c. current gain in common base and common emitter amplifier. Also find a

relation between them.

Watch Video Solution

**65.** Write the relation between current gains $\alpha$ and $\beta$

Watch Video Solution

**66.** define the trans-conductance of a transistor.

Watch Video Solution

**67.** What kinds of biasing are required to the collector and base of a transistor in a common emitter amplifier?

Watch Video Solution

**68.** Why is common emitter amplifier preferred over common base amplifier?

Watch Video Solution

**69.** Which one will you prefer, a common base or a common emitter amplifier?

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**70.** Portable radio receiver sets are generally not made with electron tube circuits. Why?

Watch Video Solution

**71.** Explain the advantages and disadvanatges of semiconducting devices as compared to vaccum tube devices.

Watch Video Solution

**72.** State two disadvantages of semiconductors devices.

Watch Video Solution

**73.** What is an integrated circuit?

Watch Video Solution

**74.** Explain the two processes involved in the formation of a p-n junciton diode. Hence defien the term"barrier potential".

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**75.** Why can't we take one slab of p-type semiconductor and physically join it to another slab of n-type semiconductor to get a p-njunction?

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**76.** Explain the terms depletion layer and potential barrier for a junction diode.

Watch Video Solution

**77.** What do you mean by depletion region in a p-n junction ?

Watch Video Solution

**78.** In the depletion region of a diode

Watch Video Solution

**79.** Explain how the depletion layer and barrier potential are formed in pn junction diode ?

Watch Video Solution

**80.** How does the width of the depletion region of a p-n junction vary if the reverse bias applied to it decreases?

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**81.** The resistance of a p-n junction is low, when forward biased and is high, when reverse is biased. Explain.

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**82.** How is forward biasing different from reverse biasing in a p-n junction diode?

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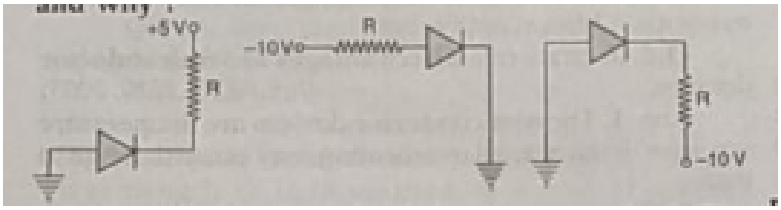
**83.** Explain forward bias and reverse bias of the junction diode.

Watch Video Solution

**84.** In the following circuits, which of the diodes is forward-biased and which is reverse-biased and why?

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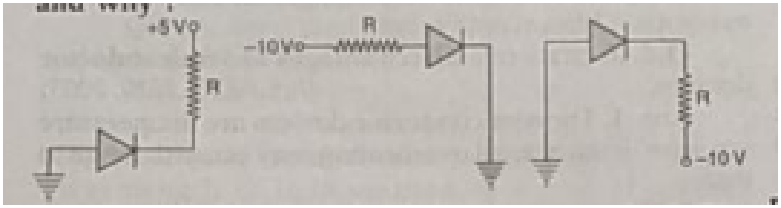
**85.** In the following circuits, which of the diodes is forward-biased and which is reverse-

biased and why?

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**86.** Which type of biasing gives a semiconductros diode vary high resistance?

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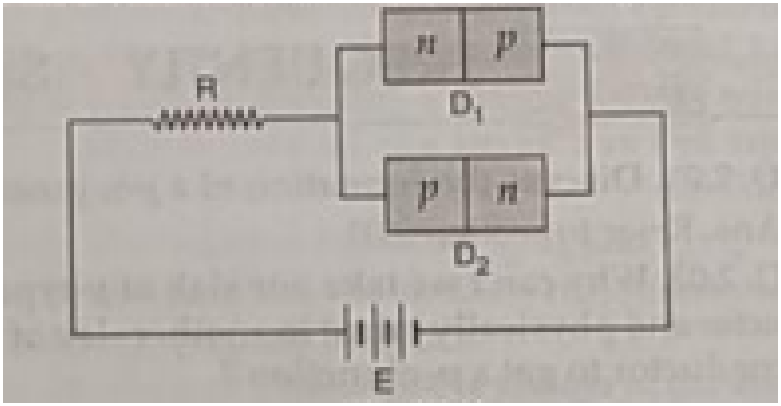
**87.** Show in figure two p-n junction diodes along-with a resistanc R and a d.c. battery E. Indicate the path and direction of flow of appreciable current in the circuit.

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**88.** The following table provides the set of values, of V and I, obtained for a given diode. Assuming the characteristics to be nearly linear, over this range, calculate the forward and reverse bias resistance of the given diode.

| Forward biasing | | Reverse biasing | |
|---|---|---|---|
| V | I | V | I |
| 2 V | 60 mA | 0 V | 0 μA |
| 2.4 V | 80 mA | −2 V | − 025 μA |

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**89.** Draw the graph showing the variation of current with voltage for a p-n junction diode.

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**90.** Draw the voltage current characterstics of a p-n junction bias?

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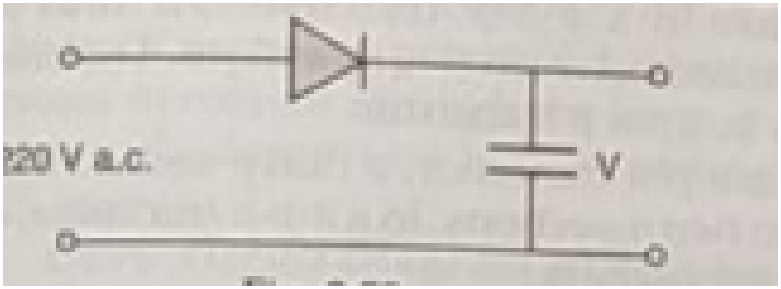
**91.** A diode is connected to 220V (r.m.s) a.c. in series with a capacitor as shown in the figure.

What is the voltage V across the capacitor is

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**92.** Draw the circuit diagram of a half wave rectifier using a junction diode.

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**93.** Draw a labelled circuit diagram of a full wave rectifier using junction diodes.

Watch Video Solution

**94.** With the help of circuit diagram explain working of junction diode as full wave rectifier.

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**95.** State the function of a zener diode in a circuit.

Watch Video Solution

**96.** Which special type of diode can act as a voltage regulator? Give the symbol of this diode and draw the general shape of its V-I characteristics.

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**97.** Write briefly, how a Zener diode acts as voltage regulator.

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**98.** How do we choose the semiconductor, to be used in LED, if the emitted radiation is to be in the visible region?

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**99.** The current in the forward bias is known to be more $(\sim mA)$ than the current in the reverse bias $(\sim \mu A)$. What is the reason then to operate the photodiodes in reverse bias?

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**100.** What is light emitting diode (LED)?

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**101.** What the help of a diagram, show that biasing of a light emitting diode (LED). Give its two advantages over conventional incandescent lamps.

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**102.** With the help of an activity, explain the method of inducing an electric current in a coil with a moving magnet. Mention one

practical application of electromagnetic induction.

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**103.** Represent sybolically Zener diode, photodiode, n-p-n and p-n-p transistors.

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**104.** Write the function of base region of a transistor. Why is the region made thin and

slightly doped?

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**105.** How does the collector current change in a junction transistor, if the base region has larger width?

Watch Video Solution

**106.** In a transistor, forward bias is always small as compared to the reverse bias. Why?

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**107.** In a transistor, doping level in base is increased slightly. Now will it affect collector current?

Watch Video Solution

**108.** In a transistor, doping level in bse is increased slightly. Now will it affect base current?

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**109.** Explain the following A transistor is a temperature - senstive device.

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**110.** Explain the following A transistorised circuit starts working immediately after the circuit is switched on, whereas a vacuum tube circuit takes some time to start working.

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**111.** How will you test in a simple way whether the transistor is spoiled or in working order?

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**112.** What is transistor ? Give the symbols of n-p-n and p-n-p transistor.

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**113.** What is transistor? Give symbols of p-n-p and n-p-n transistor.

Watch Video Solution

**114.** Discuss the working of p-n-p transistor as an amplifier in common emitter mode.

Watch Video Solution

**115.** Why a transistor cannot be used as a rectifier ?

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**116.** Consider a npn transistor with its base-emiter junction forward biased and collector base junction reverse biased. Which of the following statements are true?

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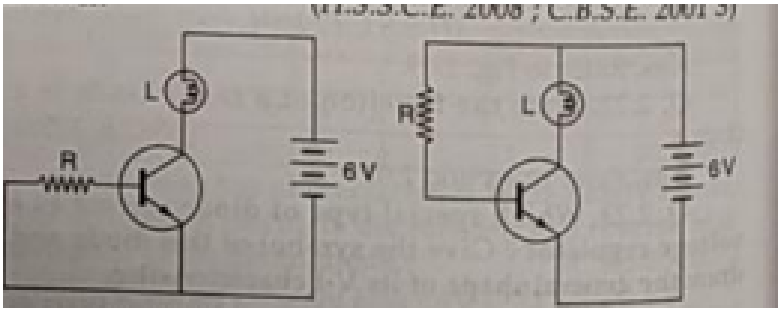
**117.** In only one of the circuits given below, the lamp L lights. Which circuit is it? Given reason for your answer.

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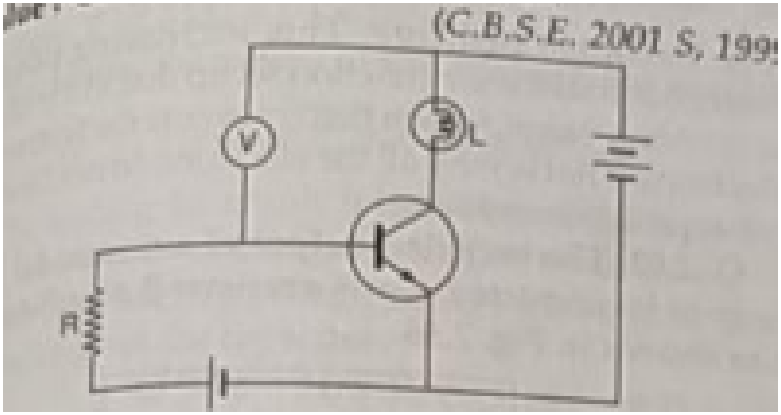
**118.** In the circuit shown in Fig.a voltage V is connected across lamp L. What changes would occur at lamp and the voltage V, if the

resistance R is reduced in value?

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**119.** Draw circuit diagram of common base amplifier using p-n-p transistor.

Watch Video Solution

**120.** Discuss the working of p-n-p transistor as an amplifier in common emitter mode.

Watch Video Solution

**121.** Discuss the working of p-n-p transistor as an amplifier in common emitter mode.

Watch Video Solution

**122.** Why the output voltage is out of phase with the input voltage ina common emitter

transistor amplifier?

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**123.** Draw the circuit of a transistor as an amplifier.

Watch Video Solution

**124.** Define current gains, $\alpha$ and $\beta$ of a transistor.

Watch Video Solution

**125.** Discuss the working of n-p-n transistor as an amplifier in common base mode.

Watch Video Solution

**126.** Write the relation between current gains $\alpha$ and $\beta$

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**127.** A transistor has a current gain of 30. If the collector resistance is $6k\Omega$, input resistance is $1k\Omega$ calculate its voltage gain.

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**128.** AC current gain for transistor in common emitter amplifier is 20. If input and output resistances are $2k\Omega$ and $5K\Omega$ respectively, find: Voltage gain

Watch Video Solution

**129.** AC current gain for transistor in common emitter amplifier is 20. If input and output resistances are $2k\Omega$ and $5K\Omega$ respectively, find: Power gain

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**130.** What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP transistor.What is the function of feed back coil in it ? Write an expression for the

frequency of waves produced by it.What is the use of waves produced by it ?

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**131.** What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP transistor.What is the function of feed back coil in it ? Write an expression for the frequency of waves produced by it.What is the use of waves produced by it ?

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**132.** Explain the advantages and disadvanatges of semiconducting devices as compared to vaccum tube devices.

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**133.** Explain the advantages and disadvanatges of semiconducting devices as compared to vaccum tube devices.

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**134.** In a p-n junction diode, the current I can be expressed as $I = I_0 \exp\left(\frac{eV}{2k_BT}\right)$ where $I_0$ is called the reverse saturation current, V is the voltage across the diode and is positive for forward bias and negative for reverse bias, and I is the current through the diode, $k_B$ is the Boltzmann constant $\left(8.6 \times 10^{-5} \frac{eV}{K}\right)$ and T is the absolute temperature. If for a given diode $I_0 = 5 \times 10^{-12} A$ and T = 300 K, then - What will be the increase in the current if the voltage across the diode is increased from 0.6 V to 0.7 V?

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**135.** In a p-n junction diode, the current I can be expressed as $I = I_0\left(\exp\left(\frac{eV}{2k_BT}\right) - 1\right)$ where I_0 is called the reverse saturation current, V is the voltage across the diode and is positive for forward bias and negative for reverse bias, and I is the current through the diode, k_B is th Boltzmann constant (8.6xx 10^ -5 eV/K) and T is the absolute temperature. If for a given diode I_0 = 5 xx 10^ -12 A and T =

300 K, then - What will be the forward current at a forward voltage of 0.6 V?

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**136.** In a p-n junction diode, the current I can be expressed as $I = I_0 \exp\left(\frac{eV}{2k_BT}\right)$ where $I_0$ is called the reverse saturation current, V is the voltage across the diode and is positive for forward bias and negative for reverse bias, and I is the current through the diode, $k_B$ is th Boltzmann constant $\left(8.6 \times 10^{-5} \frac{eV}{K}\right)$ and T

is the absolute temperature. If for a given diode $I_0 = 5 \times 10^{-12} A$ and T = 300 K, then - What is the dynamic resistance when the voltage is increased to 0.7 V from 0.6 V?

Watch Video Solution

**137.** In a p-n junction diode, the current I can be expressed as $I = I_0 \left( \exp\left( \frac{eV}{2k_B T} \right) - 1 \right)$ where I_0 is called the reverse saturation current, V is the voltage across the diode and is positive for forward bias and negative for

reverse bias, and I is the current through the diode, k_B is th Boltzmann constant (8.6xx 10^-5 eV/K) and T is the absolute temperature. If for a given diode I_0 = 5 xx 10^ -12` A and T = 300 K, then - What will be the current if reverse bias voltage changes from 1 V to 2 V?

Watch Video Solution

**138.** An n-type semiconductor is the one which has excess of free electrons and p-type semiconductor is deficient in these. When a p-

n junction is formed, the electrons should flow from n to p region. But all the electrons do not do so. Explain, why.

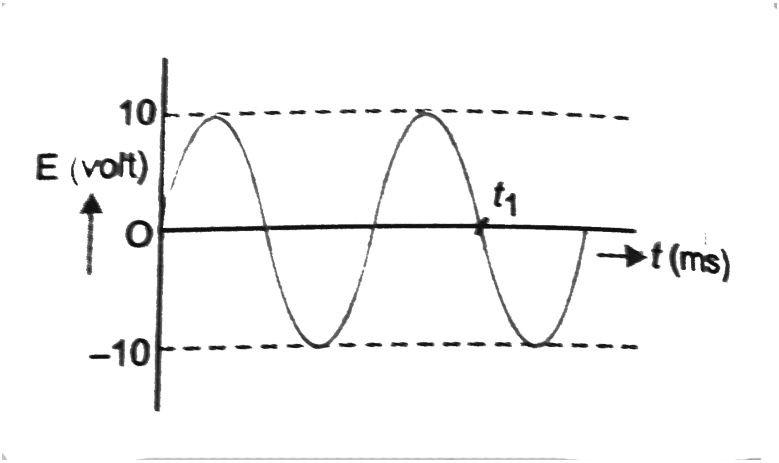
Watch Video Solution

**139.** The output E of an alternating voltage supply of frequency 50 Hz is shown in Fig. From this Fig, state

(i) value of time $t_1$

(ii) peak voltage$E_0$ (iii) root mean square voltage $E_v$

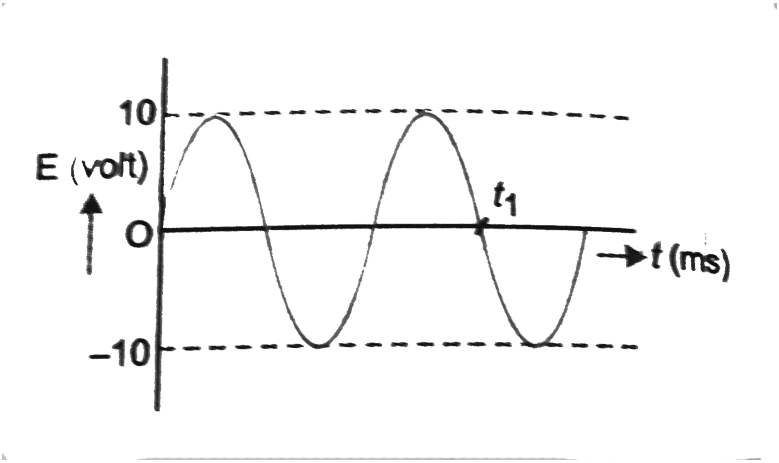
(iv) mean supply is connected in series with a resistance of $2.4\Omega$, calculate the mean power dissipated in the resistor.




Watch Video Solution

**140.** The output E of an alternating voltage supply of frequency 50 Hz is shown in Fig. From this Fig, state

root mean square voltage $E_v$



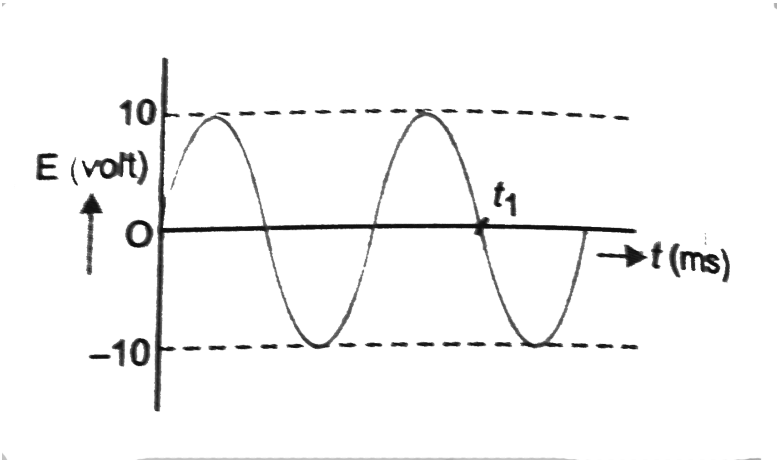

Watch Video Solution

**141.** The output E of an alternating voltage supply of frequency 50 Hz is shown in Fig. From this Fig, state

(i) value of time $t_1$

(ii) peak voltage$E_0$ (iii) root mean square voltage $E_v$

(iv) mean supply is connected in series with a resistance of $2.4\Omega$, calculate the mean power dissipated in the resistor.




Watch Video Solution

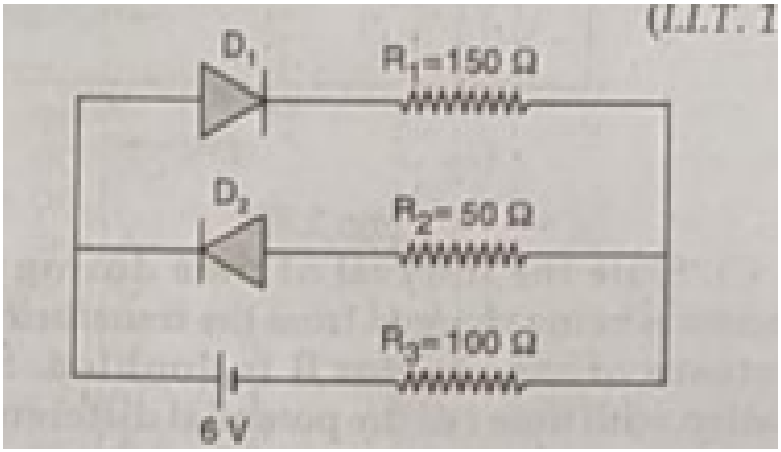
**142.** A sinusoidal alternating voltage is to be rectified. Suggest one advantage of full-wave rectification as compared with half-wave rectification.

Watch Video Solution

**143.** An ideal transformer has 5,000 turns on its primary coil . It is to be used to convert a mains supply of 230 V.to an alternating voltage having a peak value of 9.0 V. Calculate the number of turns on the secondary coil.

Watch Video Solution

**144.** The circuit shown in the figure contains two diodes each with a forward resistance of $30\Omega$ and with infinite backward resistance. If the battery is 3 V, the current through the $100\Omega$ resistance (in ampere)




Watch Video Solution

**145.** A block diagram for an electronic sensor is shown in the figure

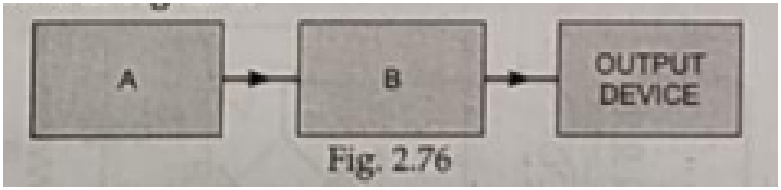


Fig. 2.76

In figure name the boxes A and B.

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## Exercise

**1.** Explain the two processes involved in the formation of a p-n junciton diode. Hence

defien the term"barrier potential".

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**2.** Describe briefly, with the help of a diagram, the role of the two important process involved in the formation of a p-n junction.

Watch Video Solution

**3.** What do you mean by depletion region in a p-n junction ?

Watch Video Solution

**4.** Explain the terms depletion layer and potential barrier for a junction diode.

Watch Video Solution

**5.** Explain the terms depletion layer and potential barrier for a junction diode.

Watch Video Solution

**6.** Explain the two processes involved in the formation of a p-n junciton diode. Hence defien the term"barrier potential".

Watch Video Solution

**7.** Explain forward bias and reverse bias of the junction diode.

Watch Video Solution

**8.** Explain forward bias and reverse bias of the junction diode.

Watch Video Solution

**9.** Explain forward bias and reverse bias of the junction diode.

Watch Video Solution

**10.** With the help of circuit diagram, explain theV-I characteristics of p-n junction diode in reverse biasing.

Watch Video Solution

**11.** Draw a circuit diagram with a p-n junction in forward bias.

Watch Video Solution

**12.** With the help of circuit diagram, explain theV-I characteristics of p-n junction diode in forward biasing.

Watch Video Solution

**13.** Draw a circuit diagram with a p-n junction in forward bias.

Watch Video Solution

**14.** Explain with the help of circuit diagram, how V-I characteristics of pn junction diode are obtained in forward biasing.

Watch Video Solution

**15.** With the help of circuit diagram, explain theV-I characteristics of p-n junction diode in reverse biasing.

Watch Video Solution

**16.** Define the term dynamic resistance of a p-n junction diode.

Watch Video Solution

**17.** Define Rectification. With the help a circuit diagram explain the working of p-n junction diode as a half wave rectifier.

Watch Video Solution

**18.** With the help of circuit diagram explain working of junction diode as full wave rectifier.

Watch Video Solution

**19.** Draw the circuit diagram of a half wave rectifier using a junction diode.

Watch Video Solution

**20.** Draw the circuit diagram of a half wave rectifier using a junction diode.

Watch Video Solution

**21.** What is rectifier ? Explain the working of junction diode as a full wave rectifier, with diagram.

Watch Video Solution

**22.** What is rectifier ? Explain the working of junction diode as a full wave rectifier, with diagram.

Watch Video Solution

**23.** With the help of suitable diagrams, explain the function of p-n junction diode as full wave rectifier.

Watch Video Solution

**24.** Draw a labelled circuit diagram of a full wave rectifier using junction diodes.

Watch Video Solution

**25.** With the help of circuit diagram explain working of junction diode as full wave rectifier.

Watch Video Solution

**26.** Draw a circuit diagram with a p-n junction in forward bias.

Watch Video Solution

**27.** Draw a circuit diagram with a p-n junction atreverse bias.

Watch Video Solution

**28.** What the help of a diagram, show that biasing of a light emitting diode (LED). Give its two advantages over conventional incandescent lamps.

Watch Video Solution

**29.** Name the semiconductor device that can be used to regulate an unregulated d.c. power supply. With the help of I-V characteristics of this device, explain its working principle.

Watch Video Solution

**30.** Name the devic,e which is used as a voltage regulator. Draw the necessary circuit diagram and explain its working.

Watch Video Solution

**31.** Wha tis a zener diode? How is it symbollically represented? With the help of a circuit diagram, explain the use of zener diode as a voltage stabilizer

Watch Video Solution

**32.** What is Zener diode?

Watch Video Solution

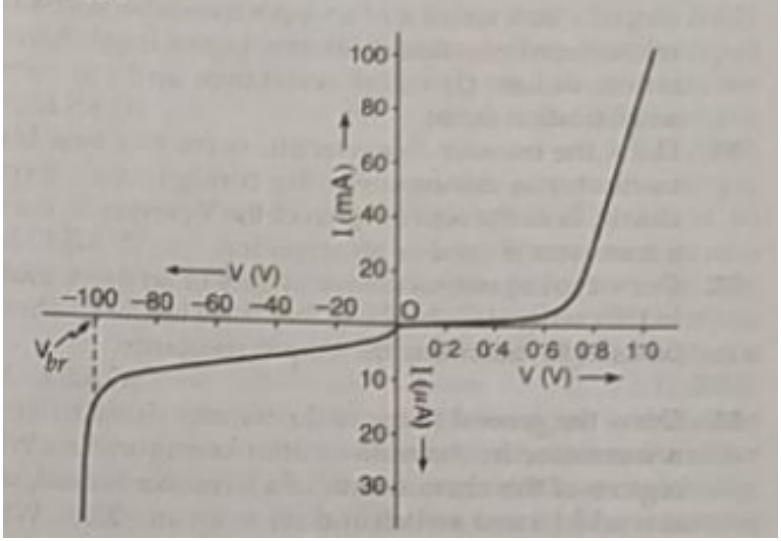
**33.** Write briefly, how a Zener diode acts as voltage regulator.

Watch Video Solution

**34.** What is the most common application of a zener diode?

Watch Video Solution

**35.** In figure shows the V-I characterstics of semiconductor diode.

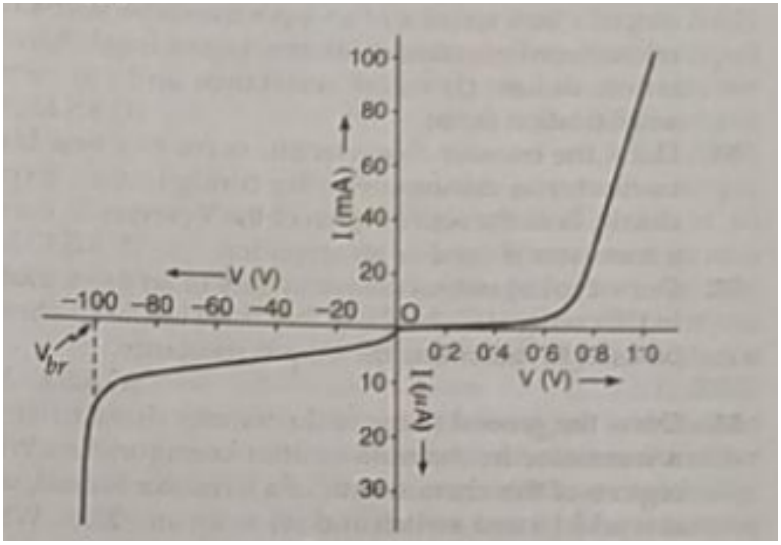



Identify the semiconductor diode.

Watch Video Solution

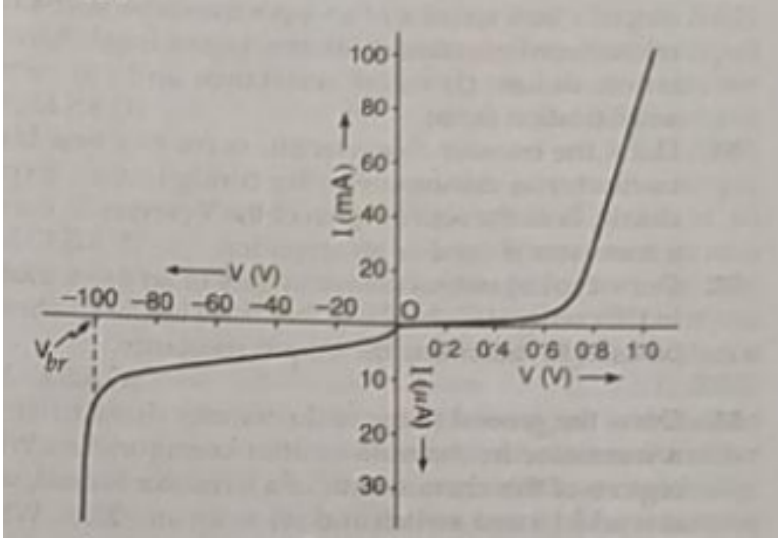
**36.** In figure shows the V-I characteristics of semiconductor diode. Draw the circuit diagram to obtain the given characteristic of

this device.




Watch Video Solution

**37.** In figure shows the V-I characterstics of semiconductor diode.




Briefly explain, how this diode can be used as a voltage regulator.

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**38.** Draw the current versus voltage characteristics curve of a Zener diode. Indicate

the position of Zener voltage. Draw a labelled circuit diagram of a d.c. voltage regulator using a Zener diode.

Watch Video Solution

**39.** Write in brief about Photo-diodes.

Watch Video Solution

**40.** What is Zener diode?

Watch Video Solution

**41.** Draw a circuit diagram to show how a photodiode is biased.

Watch Video Solution

**42.** Distinguish between the light emitting diode and photo diode.

Watch Video Solution

**43.** What the help of a diagram, show that biasing of a light emitting diode (LED). Give its two advantages over conventional incandescent lamps.

Watch Video Solution

**44.** Explain, with the help of a schematic diagram, the principle and working of a Light Emiting Diode. What criterion is kept in mind while choosing the semiconductor material for

such a device ? Write any two advantages of light emiting diode over conventional incandescent lamps.

Watch Video Solution

**45.** Mention two types of junction transistor. How are they represented.

Watch Video Solution

**46.** Write the function of base region of a transistor. Why is the region made thin and slightly doped?

Watch Video Solution

**47.** What is transistor ? Give the symbols of n-p-n and p-n-p transistor.

Watch Video Solution

**48.** What is transistor? Give symbols of p-n-p and n-p-n transistor.

Watch Video Solution

**49.** With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.

Watch Video Solution

**50.** With the help of a circuit diagram, explain the action of a N-P-N junction transistor.

Watch Video Solution

**51.** With the help of a circuit diagram, explain the action of a N-P-N junction transistor.

Watch Video Solution

**52.** What is transistor ? Give the symbols of n-p-n and p-n-p transistor.

Watch Video Solution

**53.** Draw the circuit arrangement for studying the output characterstics of n-p-n transistor in CE configuration. Explain how the output characterstics is obtained.

Watch Video Solution

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Watch Video Solution

**56.** Draw the circuit arrangement for studying the output characterstics of n-p-n transistor in CE configuration. Explain how the output characterstics is obtained.

Watch Video Solution

**57.** Explain with diagram, the working of a transistor as a common-emitter amplifier.

Watch Video Solution

**58.** Explain with diagram, the working of a transistor as a common-emitter amplifier.

Watch Video Solution

**59.** Explain , why the input resistance of a transistor is low and output resistance is high.

Watch Video Solution

**60.** If the emitter and base of n-p-n transistor have same doping concentration, explain, how will the collector and base currents be affected.

Watch Video Solution

**61.** Discuss the working of p-n-p transistor as an amplifier in common emitter mode.

Watch Video Solution

**62.** What is an amplifier?

Watch Video Solution

**63.** With the help of a circuit diagram, explain the action of a N-P-N junction transistor.

Watch Video Solution

**64.** Discuss the working of n-p-n transistor as an amplifier in common base mode.

Watch Video Solution

**65.** Discuss the working of p-n-p transistor as an amplifier in common emitter mode.

Watch Video Solution

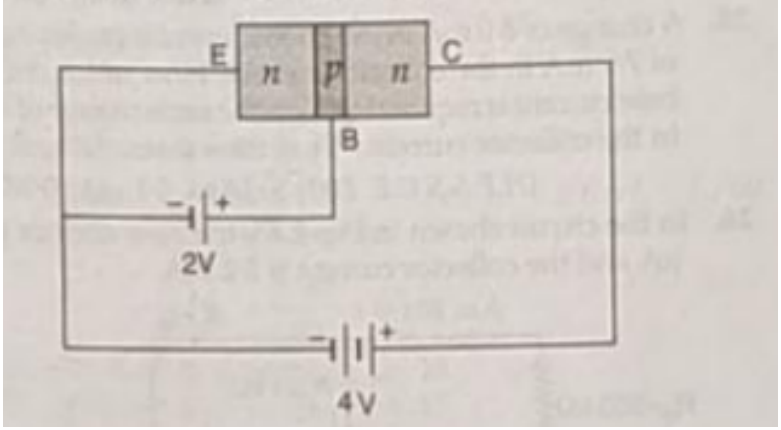
**66.** Discuss the working of n-p-n transistor as an amplifier in common base mode.

Watch Video Solution

**67.** What is an amplifier ? Draw a circuit diagram for an amplifier withPNP transistor in common emitter configuration. Also define current gain, voltage gain and power gain for it.

Watch Video Solution

**68.** In the n-p-n transistor circuit shown in the figure.




What is the biasing. Between emitter base and collector-base junctions?

Watch Video Solution

**69.** What is an amplifier ? Draw a circuit diagram for an amplifier withPNP transistor in common emitter configuration. Also define

current gain, voltage gain and power gain for it.

Watch Video Solution

**70.** With the help of lebelled circuit diagram, discuss the working of transistor as a common emitter amplifier.Find the phase relationship between input and output signals. Also define its voltage gain.

Watch Video Solution

**71.** With the help of lebelled circuit diagram, discuss the working of transistor as a common emitter amplifier.Find the phase relationship between input and output signals. Also define its voltage gain.

 Watch Video Solution

**72.** With the help of lebelled circuit diagram, discuss the working of transistor as a common emitter amplifier.Find the phase relationship

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Watch Video Solution

**73.** With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.

Watch Video Solution

**74.** With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.

Watch Video Solution

**75.** Discuss the working of n-p-n transistor as an amplifier in common base mode.

Watch Video Solution

**76.** Define d.c. current gain in common base and common emitter amplifier. Also find a relation between them.

Watch Video Solution

**77.** With the help of circuit diagram, explain the working of transistor as a oscillator.

Watch Video Solution

**78.** With the help of circuit diagram, explain the working of transistor as a oscillator.

Watch Video Solution

**79.** With the help of circuit diagram, explain the working of transistor as a oscillator.

Watch Video Solution

**80.** What is an electric oscillator ? With the help of labelled diagram, explain the use of junction transistor as.an oscillator.

Watch Video Solution

**81.** Draw the circuit of a transistor as an amplifier.

Watch Video Solution

**82.** A transistor can be used as a switch by operating it in its cut off state or saturation state. (Yes/No)

Watch Video Solution

**83.** Explain the advantages and disadvanatges of semiconducting devices as compared to vaccum tube devices.

Watch Video Solution

**84.** Explain the advantages and disadvanatges of semiconducting devices as compared to vaccum tube devices.

Watch Video Solution

**85.** give important uses of integrated circuits. .

Watch Video Solution

**86.** Explain the terms depletion layer and potential barrier for a junction diode.

Watch Video Solution

**87.** Explain the terms depletion layer and potential barrier for a junction diode.

Watch Video Solution

**88.** How does the junction width change when a p-n junction is forward biased?

Watch Video Solution

**89.** What is a p-n junction ? Explain with the help of a diagram, how depeletion layer is formed near the junction. Also explain what happens to this layer, when the junction is reversed biased.

Watch Video Solution

**90.** Explain how the depletion layer and barrier potential are formed in pn junction diode ?

Watch Video Solution

**91.** P-N junction is:

Watch Video Solution

**92.** What is junction diode ? How is depletion layer formed ? Draw its forward and reverse bias characteristics by showing biasing of diodes ?

Watch Video Solution

**93.** Answer the following questions: Why is the current under reverse bias independent to the applied potential up to a critical voltage?

Watch Video Solution

**94.** Answer the following questions: Why does the reverse current show a sudden increase at the critical voltage?

Watch Video Solution

**95.** Draw the voltage current characterstics of a p-n junction bias?

Watch Video Solution

**96.** The resistance of a p-n junction is low, when forward biased and is high, when reverse is biased. Explain.

Watch Video Solution

**97.** Explain with the help of circuit diagram, how V-I characteristics of pn junction diode are obtained in forward biasing.

Watch Video Solution

**98.** With the help of circuit diagram, explain theV-I characteristics of p-n junction diode in reverse biasing.

Watch Video Solution

**99.** Define Rectification. With the help a circuit diagram explain the working of p-n junction diode as a half wave rectifier.

Watch Video Solution

**100.** Define Rectification. With the help a circuit diagram explain the working of p-n junction diode as a half wave rectifier.

Watch Video Solution

**101.** Define Rectification. With the help a circuit diagram explain the working of p-n junction diode as a half wave rectifier.

Watch Video Solution

**102.** What is rectifier ? Explain the working of junction diode as a full wave rectifier, with diagram.

Watch Video Solution

**103.** State the principle of working of p-n-diode as a rectifier. Explain with the help of a circuit diagram, the use of p-n diode as a full wave rectifier. Draw a sketch of the input and output waveforms.

Watch Video Solution

**104.** Discuss the construction and working of diode as full wave rectifier

Watch Video Solution

**105.** Draw a labelled circuit diagram of a full wave rectifier using junction diodes.

Watch Video Solution

**106.** Draw a labelled circuit diagram of a full wave rectifier using junction diodes.

Watch Video Solution

**107.** With the help of a circuit diagram, explain the action of a N-P-N junction transistor.

Watch Video Solution

**108.** What is light emitting diode (LED)?

Watch Video Solution

**109.** What is transistor ? Give the symbols of n-p-n and p-n-p transistor.

Watch Video Solution

**110.** What is transistor? Give symbols of p-n-p and n-p-n transistor.

Watch Video Solution

**111.** With the help of a circuit diagram, explain the action of a N-P-N junction transistor.

Watch Video Solution

**112.** With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.

Watch Video Solution

**113.** Draw circuit diagram of common base amplifier using p-n-p transistor.

Watch Video Solution

**114.** Draw the circuit arrangement for studying the output characterstics of n-p-n transistor in CE configuration. Explain how the output characterstics is obtained.

Watch Video Solution

**115.** For an n-p-n transistor in the common emitter configuration, draw a labelled circuit diagram of an arrangement for measuring the collector current as a function of colelctor emiter voltage for at least wo different vlaue sof base current. Draw the shape of the curves obtained. Define the terms outpout resistance

Watch Video Solution

**116.** In a p-n-p transistor circuit, the collector current is 10mA , If 90% of the electrons

emitted reach the collector , what is base current ?


**117.** With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.

**118.** Draw the circuit arrangement for studying the output characterstics of n-p-n transistor in CE configuration. Explain how the output characterstics is obtained.

Watch Video Solution

**119.** Define input resistance of a transistor used in its common emitter configuration.

Watch Video Solution

**120.** Define input resistance of a transistor used in its common emitter configuration.

Watch Video Solution

**121.** Define input resistance of a transistor used in its common emitter configuration.

Watch Video Solution

**122.** Discuss the working of n-p-n transistor as an amplifier in common base mode.

Watch Video Solution

**123.** Draw circuit diagram of common base amplifier using p-n-p transistor.

Watch Video Solution

**124.** If the emitter and base of n-p-n transistor have same doping concentration, explain, how will the collector and base currents be affected.

Watch Video Solution

**125.** With the help of labelled circuit diagram, explainthe working of transistor as a switch.

Watch Video Solution

**126.** With the help of circuit diagram, explain the working of transistor as a common emitter amplifier.

Watch Video Solution

**127.** Draw a simple circuit of a CE transistor amplifier. Explain its working. Show that the voltage gain, $A_V$ of the amplifier is given by $A_v = -\frac{\beta_{ac} R_L}{r_i}$ where $\beta_{Ac}$ is the current gain, $R_L$ is the load resistance and $r_1$ is the input resistance of the transistor. What is the

significance of the negative sign in the expression for the voltage gain?

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**128.** What is an amplifier ? Draw a circuit diagram for an amplifier withPNP transistor in common emitter configuration. Also define current gain, voltage gain and power gain for it.

Watch Video Solution

**129.** Discuss the working of p-n-p transistor as an amplifier in common emitter mode.

Watch Video Solution

**130.** What is an amplifier ? Draw a circuit diagram for an amplifier withPNP transistor in common emitter configuration. Also define current gain, voltage gain and power gain for it.

Watch Video Solution

**131.** Draw the circuit arrangement for studying the output characterstics of n-p-n transistor in CE configuration. Explain how the output characterstics is obtained.

Watch Video Solution

**132.** Explain with diagram, the working of a transistor as a common-emitter amplifier.

Watch Video Solution

**133.** Differentiate between three segmetns of a transitor on the basis of their size and level of doping.

Watch Video Solution

**134.** How is a transistor biased to be in active state?

Watch Video Solution

**135.** With the help of a circuit diagram, explain the action of a N-P-N junction transistor.

Watch Video Solution

**136.** How the common emitter n-p-n transistor is used as a switch? Explain with the help of a circuit diagram.

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**137.** Figure EP 14.11 shows the transfer characterstics of a base biased CE transistor. Which of the following statements are true?

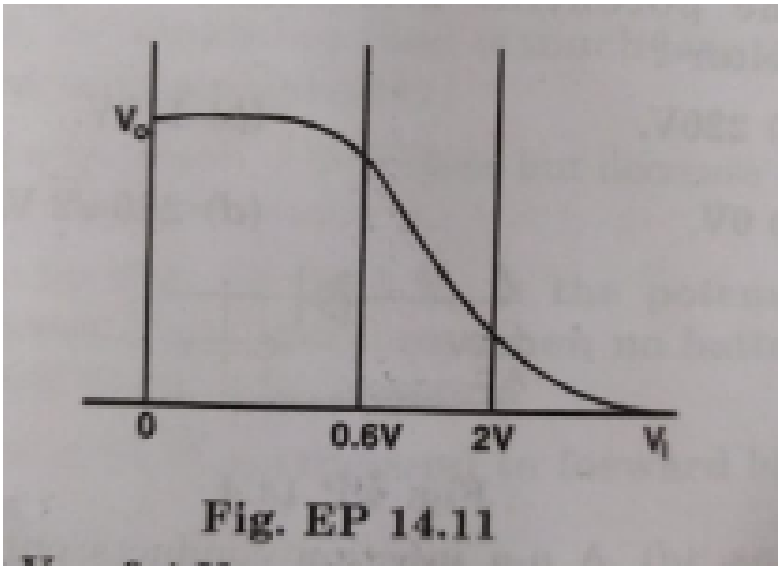


Fig. EP 14.11

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**138.** What is an electric oscillator ? With the help of labelled diagram, explain the use of junction transistor as.an oscillator.

Watch Video Solution

**139.** What is an electric oscillator ? With the help of labelled diagram, explain the use of junction transistor as.an oscillator.

Watch Video Solution

**140.** With the help of circuit diagram, explain the working of transistor as a oscillator.

Watch Video Solution

**141.** With the help of circuit diagram, explain the working of transistor as a oscillator.

Watch Video Solution

**142.** What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP transistor.What is the function of feed back coil in it ? Write an expression for the frequency of waves produced by it.What is the use of waves produced by it ?

Watch Video Solution

**143.** What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP

transistor.What is the function of feed back coil in it ? Write an expression for the frequency of waves produced by it.What is the use of waves produced by it ?

Watch Video Solution

**144.** What is an oscillator ? Draw a labelled circuit diagram for an oscillator using PNP transistor.What is the function of feed back coil in it ? Write an expression for the

frequency of waves produced by it.What is the use of waves produced by it ?

Watch Video Solution

**145.** In a forward biased silicon diode, current occurs at close to 0.7 V and increase rapdily wiht very small further potential difference increase. What current will flow, when there is a 200 ohm resistor in series with the diode with a 10 V battery across the series combination?

Watch Video Solution

**146.** A PN junction diode when forward biased has a drop of 0.5 V which is assumed to be independent of current. The current in excess of 10 mA through the diode produces large joule heating which damages the diode. If we diode, the resistor used in series with the diode so that the maximum current does not exceed 5 mA

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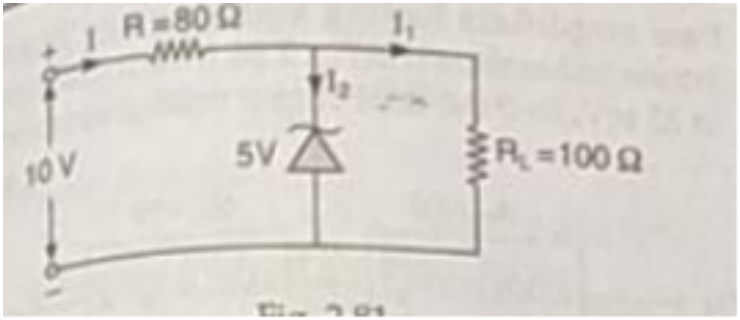
**147.** In the circuit shown in the figure, find the current passing through $r_L$ and zener diode.

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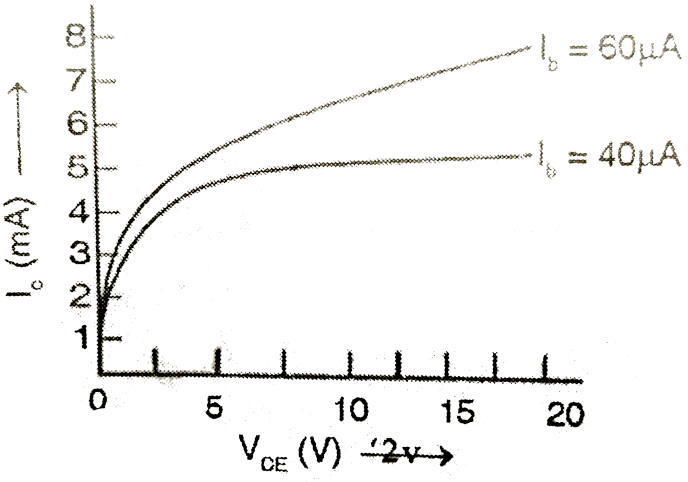
**148.** A certain n-p-n transistor has the common emitter output characteristics as shown in the figure.

Find the emitter current at $V_{CE} = 12.5V$ and $I_b = 60\mu A$,

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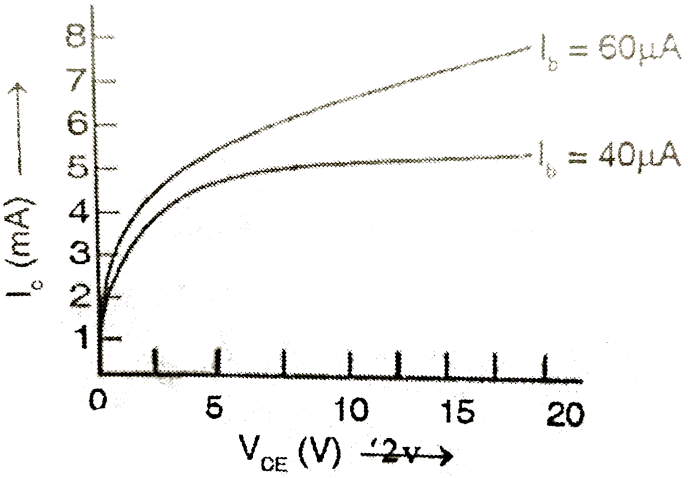
**149.** A certain n-p-n transistor has the common emitter output characteristics as shown in the figure.

Find the Current gain $'\beta'$ at V_(CE)=12.5 V and I_(b)=60 muA .

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**150.** For a common base amplifier, emitter current is 5.2 mA and base current is 0.22 mA. Find the current gain of the amplifier.

Watch Video Solution

**151.** For a transistor working as common base amplifer, current gain is 0.97 and base current is 0.12 mA. Calculate the collector and emitter current.

Watch Video Solution

**152.** In a common base transistor amplifier, if the input resistance is 200 ohm and load

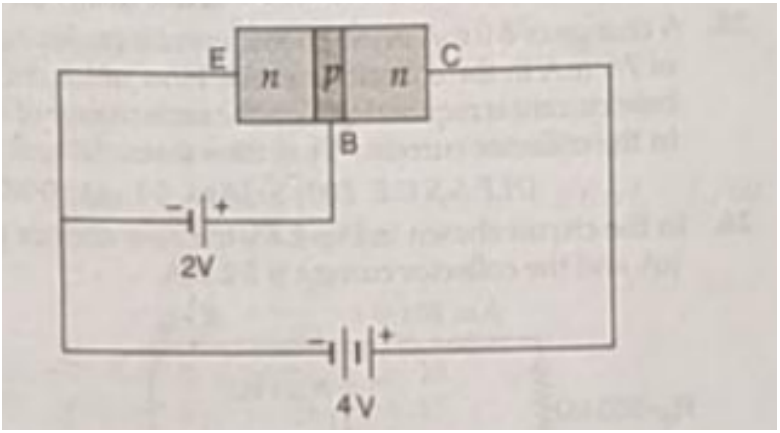
resistance is 20 kiloohm, find Voltage gain Given current gain of common base trasistor is 0.95

Watch Video Solution

**153.** In a common base transistor amplifier, if the input resistance is 200 ohm and load resistance is 20 kiloohm, find power gain. Given current gain of common base trasistor is 0.95

Watch Video Solution

**154.** In the n-p-n transistor circuit shown in the figure.




What is the potential difference between base and collector

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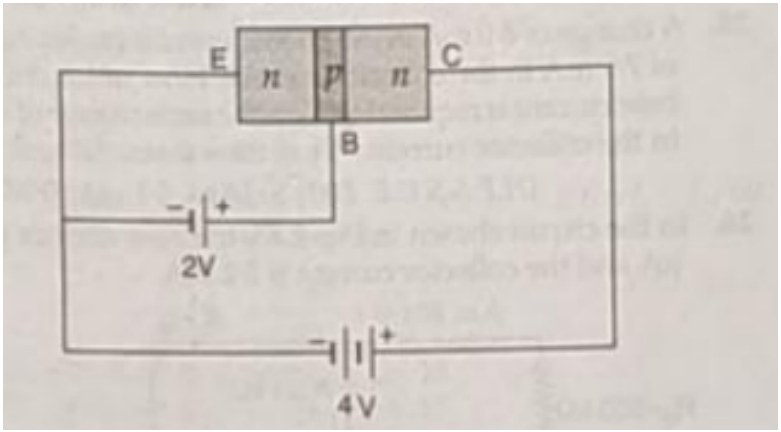
**155.** In the n-p-n transistor circuit shown in the figure.




What is the biasing. Between emitter base and collector-base junctions?

Watch Video Solution

**156.** Calculate emitter current for which $\beta$ = 100 and base current $I_b = 20\mu A$.

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**157.** For a common emitter amplifier current gain = 50 if the emitter current is 6.6 mA. Calculate the collector and base current.

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**158.** In a common-emitter mode of transistor d.c. current gain is 20 and the emitter current is 7 mA. Calculate base current

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**159.** In a common-emitter mode of transistor d.c. current gain is 20 and the emitter current is 7 mA. Calculate base current

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**160.** The current gain of a transistor in a common base arrangement is 0.95. Find the voltage gain and power gain if the load resistance of output circuit is $400k\Omega$ and the input resistance is $200\Omega$.

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**161.** A common-emitter circuit has an input resistance of 0.6 k$\Omega$ and output resistance of $51k\Omega$ . If the current gain is 64, find voltage gain and power gain.

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**162.** In a common emitter amplifier, using output reisistance of 5000 ohm and input resistance fo 2000ohm, if the peak value of input signal voltage is 10 m V and beta=50, then the peak value of output voltage ?

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**163.** A transistor connected in common emitter configuration has input resistance $R_{\text{in}} = 2K\Omega$and load resistance of$5K\Omega$. If $\beta = 60$ and an input signal 12 mV is applied , calculate the resistance gain.

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**164.** For a common emitter amplifier , current gain is 70 . If the emitter is 8.8 mA , calculate the collector and base current . Also calculate

current gain , when transistor is worked on common base amplifier.

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**165.** A common-emitter circuit has an input resistance of 0.6 k$\Omega$ and output resistance of $51k\Omega$ . If the current gain is 64, find voltage gain and power gain.

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**166.** the input resistance of a comon-emitter amplifier is $2k\Omega$ and a.c. current gain is 20. If the laod resistor used is $5k\Omega$ calculate the voltage gain of the amplifier

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**167.** the input resistance of a comon-emitter amplifier is $2k\Omega$ and a.c. current gain is 20. If the laod resistor used is $5k\Omega$ calculate the transconductance of the transistor used.

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**168.** In a transistor, a change of 7.9 mA in emitter current produces a change of 7.8 mA in the collector current produces a change of 7.7 mA in the collector current. What change in the base current is necessary to produce an equivalent change in the collector current?

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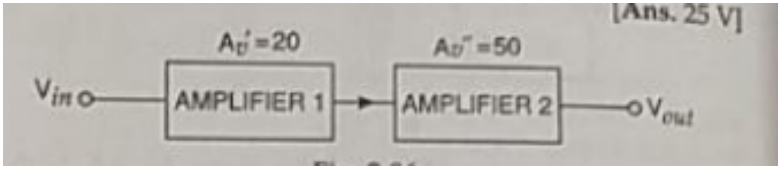
**169.** Two amplifiers having voltage gains 20 and 50 are connected as shown in the figure. If the initial input voltage is 25 mV, find the final output voltage obtained.

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**170.** A crystal diode having internal resistance $200\Omega$ is used as a half rectifier. If the applied voltage is $V = 50\sin\omega t$ volt and load

resistance is $800\Omega$, find maximum output current

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**171.** A crystal diode having internal resistance $200\Omega$ is used as a half rectifier. If the applied voltage is $V = 50\sin\omega t$ volt and load resistance is $800\Omega$, find maximum output current

Watch Video Solution

**172.** A crystal diode having internal resistance $200\Omega$ is used as a half rectifier. If the applied voltage is $V = 50 \sin \omega t$ volt and load resistance is $800\Omega$, find maximum output current

Watch Video Solution

**173.** A crystal diode having internal resistance $200\Omega$ is used as a half rectifier. If the applied voltage is $V = 50 \sin \omega t$ volt and load

resistance is $800\Omega$, find maximum output current

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**174.** A p-n photodiode is fabricated from a semiconductor with band gap of 2.8 eV. Can it detect a wavelength of 6000 nm?

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