PHYSICS

BOOKS - NCERT PHYSICS (ENGLISH)

NUCLEI

Multiple Choice Question

1. Suppose we consider a large number of continers each containing initially 10000 atoms

of a radioactive material with a half life of 1 year. After 1 year.

A. all the containers will have 5000 atoms of the material

B. all the containers will contain the same number of atoms of the material but that number will only be approximately 5000.

C. the containers will in general have different numbers of the atoms of the material but their average will be close to 5000

D. none of the containers can have more than

5000 atoms

Answer: C

Watch Video Solution

2. The gravitational force between a H-atom and another particle of mass m will be given by Newton's law: $F = G\frac{M.m}{r^2}$, where r is in km and

A. $M = M_{\text{proton}} + m_{\text{electron}}$

B.

$$M = M_{\text{proton}} + m_{\text{electron}} - \frac{B}{C^2}(B = 13.6eV)$$

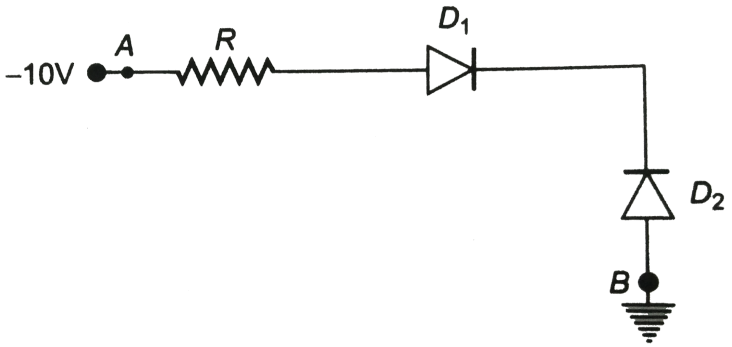
C. M is not relate to the mass of the hydrogen atom

D. $M = M_{\text{proton}} + m_{\text{electron}} - \frac{|V|}{c^2}|V| =$ magnitude of the potential energy of electron in the H-atom

Answer: B

Watch Video Solution

3. In figure , assuming the diodes to be ideal ,



A. D_1 is forward biased and D_2 is reverse biased and hence current flows from A to B

B. D_2 is forward biased and D_1 is reverse biased and hence no current flows from B to A and vice-versa.

C. D_1 and D_2 are both forward biased and hence current flows from A to B

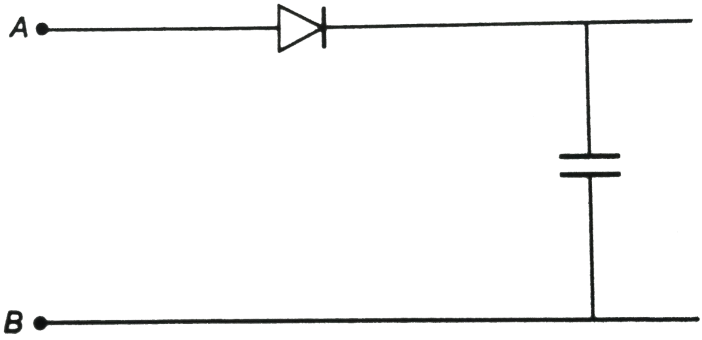
D. D_1 and D_2 are both reverse biased and hence no current flows from A to B and vice-verse.

Answer: B

Watch Video Solution

4. A 220 V AC supply is connected between points A and B . What will be the potential

difference V across the capacitor ?



A. $220V$

B. $110V$

C. $0V$

D. $220\sqrt{2}V$

Answer: D

Watch Video Solution

5. Hole is

A. an anti-particle of electron

B. a vacancy created when an electron leaves a covalent bond

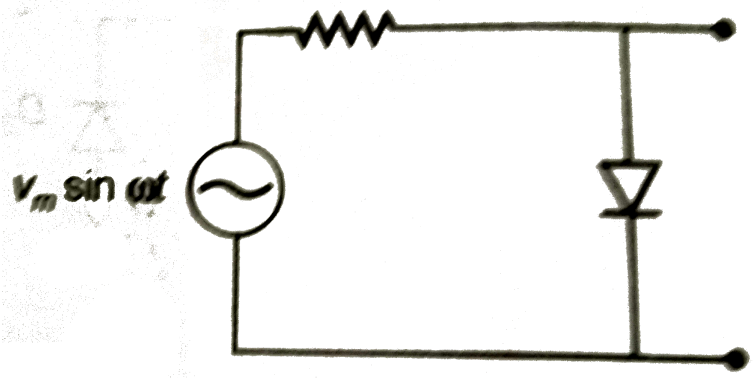
C. absence of free electrons

D. an artificially created particle

Answer: B

 Watch Video Solution

6. The output of the given circuit in figure given below,



A. would be zero at all times

B. would be like a half wave rectifier with positive cycles in output

C. would be like a half wave rectifier with negative cycles in ouput

D. would be like that of a full wave reactifier.

Answer: C

Watch Video Solution

7. In the circuit shown in figure, if the diode forward voltage drop is 0.3 V, then the voltage difference between A to B is,

A. $1.3V$

B. $2.3V$

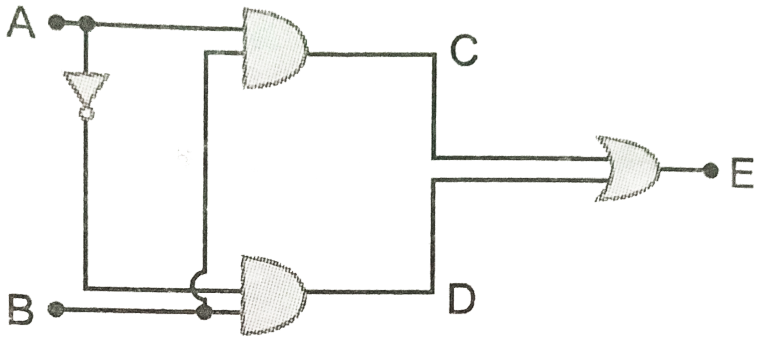
C. 0

D. $0.5V$

Answer: B

Watch Video Solution

8. Truth table for the given circuit (Fig.)is



A.

A	B	E
0	0	1
0	1	0
1	0	1
1	1	0

B.

A	B	E
0	0	1
0	1	0
1	0	0
1	1	0

C.

A	B	E
0	0	0
0	1	1
1	0	0
1	1	1

D.

A	B	E
0	0	0
0	1	1
1	0	1
1	1	0

Answer: C

Watch Video Solution

9. When an electric field is applied across a semiconductor,

A. electrons move from lower energy level to higher energy level in the conduction band

B. electrons move from higher energy level to lower energy level in the conduction band

C. holes in the valence band move from higher energy level to lower energy level

D. holes in the valence band move from lower energy level to higher energy level.

Answer: A::C

Watch Video Solution

10. Consider an n-p-n transistor with its base - emitter junction forward biased and collector

base junction reverse biased . Which of the following statements are true?

A. Electrons crossover from emitter to collector

B. Holes move from base to collector

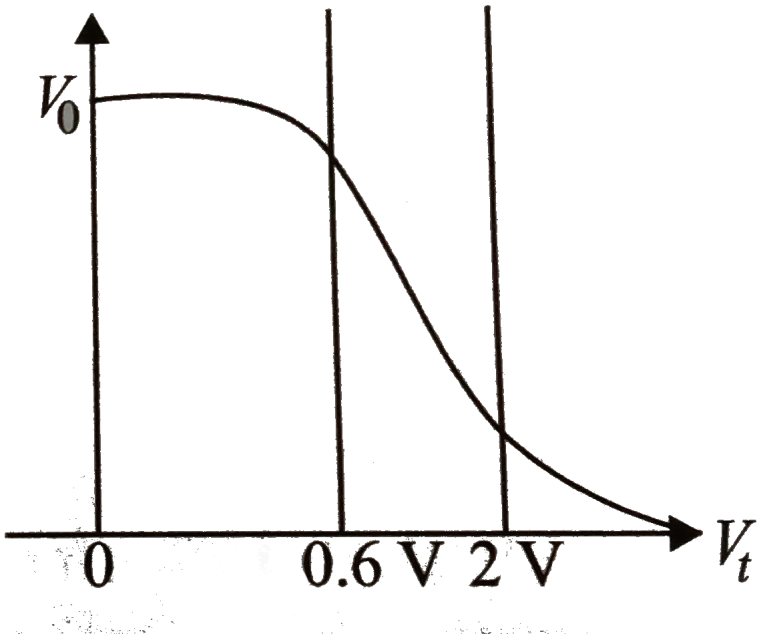
C. Electrons move form emitter to base

D. Electrons from emitter mive out to base without going to the collector.

Answer: A::C

Watch Video Solution

11. The transfer characteristics of a base biased common emitter transistor is shown in the figure. Which of the following statements are true?



A. At $V_i = 0.4V$, transistor is in active state

B. At $V_i = 1V$, it can be used as an amplifier

C. At $V_i = 0.5V$, it can be used as a switch turned off

D. At $V_i = 2.5V$, can be used as a switch turned on

Answer: B::C::D

Watch Video Solution

12. In a $n - p - n$ transistor circuit, the collector current is $10mA$. If 95 per cent of the electrons

emitted reach the collector, which of the following statements are true ?

A. The emitter current will be $8mA$

B. The emitter current will be $10.53mA$

C. The base current will be $0.53mA$

D. The base current will be $2mA$

Answer: B::C

Watch Video Solution

13. In the depletion region of a diode.

A. there are no mobile charges

B. equal number of holes and elections exist, making the regin neutal

C. recombination of holes and electrons has taken place

D. immobile charged ions exist.

Answer: A::B::C:D

Watch Video Solution

14. What happens during regualtion action of a Zener diode?

A. The current and voltage across the Zener remains fixed

B. The current through the series Resistance (R_s) changes

C. The Zener resistance is constant

D. The resistance offered by the Zener change.

Answer: A::D

Watch Video Solution

15. To reduce the ripples in rectifier circuit with capacitor filter

A. R_L should be increased

B. input frequency should be increased

C. input frequency should be increased

D. capacitors with high capacitance should be used

Answer: A::C::D

Watch Video Solution

16. The breakdown in a reverse biased p-n junction diode is more likely to occur due to

A. large velocity of the minority charge carriers if the dopping concentration is small

B. large velocity of the minority charge carriers if the dopping concentration is large

C. strong electric field in a depletion region if the droping concentration is small

D. strong electric field in the depletion region if the doping concentration is large.

Answer: A::D

Watch Video Solution

Very Short Anwer Type Question

1. Why are elemental dopants for Silicon or Germanium usually chosen from group XIII or group XV?

Watch Video Solution

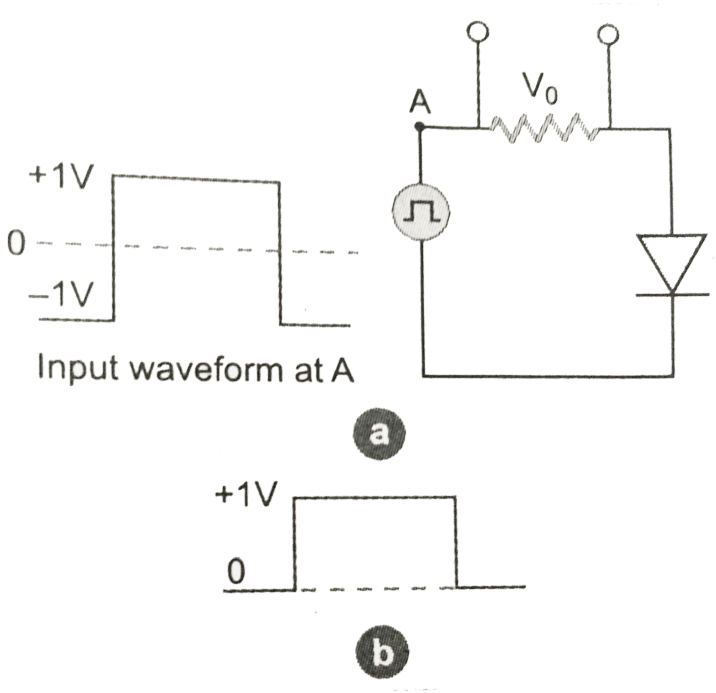
2. Sn, C, Si and Ge are all group XIV elements . Yet , Sn is a conductor , C is an insulator while Si and Ge are semiconductors . Why?

Watch Video Solution

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

Watch Video Solution

4. Draw the output waveform across the resistor (Fig.)



Watch Video Solution

5. The amplifiers X, Y and Z are connected in series. If the voltage gains of X, Y and Z are $10, 20$ and 30, respectively and the input signal is

$1mV$ peak value, then what is the output signal voltage (peak value)

(i) if dc supply voltage is 10V ?

(ii) if dc supply voltage is 5V?

Watch Video Solution

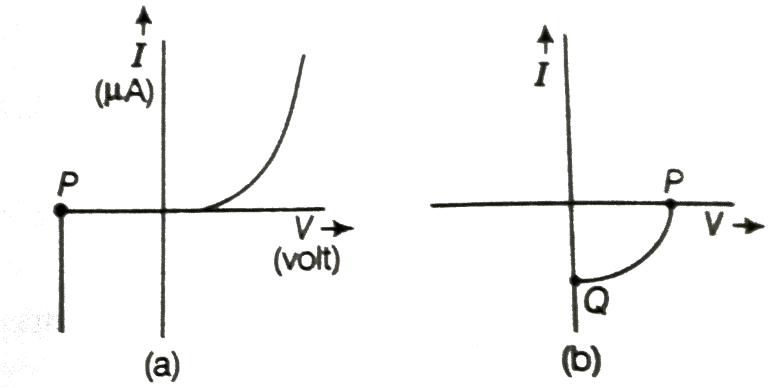
6. In a CE transistor amplifier, there is a current and voltage gain associated with the circuit. In other words there is a power gain. Considering power a measure of energy, does the circuit violate conservation of energy ?

Watch Video Solution

7. (i) Name the type of a diode whose characteristics are shown in figure (a) and (b)

(ii) What does the point P in fig. (a) represent ?

(iii) What does the point P and Q in fig. (b) represent ?



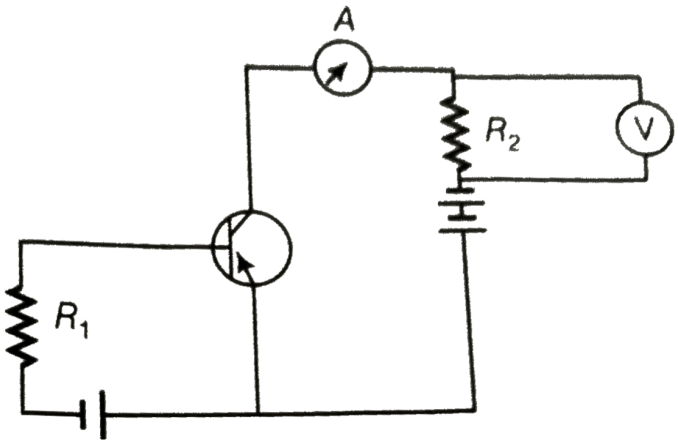
Watch Video Solution

8. Three photodiodes D_1, D_2 and D_3 are made of semiconductors having band gaps of $2.5eV$, $2eV$ and 3 eV , respectively . Which one will be able to detect light of wavelength 6000Å ?

Watch Video Solution

9. If the resistance R_1 is increased (see figure), how will the reading of the ammeter and

voltmeter change ?



Watch Video Solution

10. Two car garages have a common gate which needs to open automatically when a car enters either of the garages or cars enter both. Devise a

circuit that resembles this situation using diodes for the situation .

Watch Video Solution

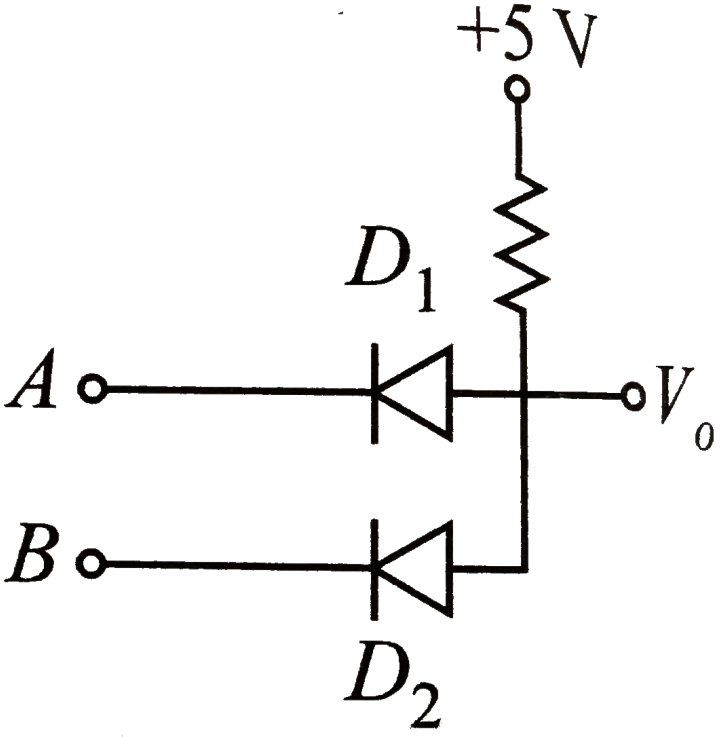
11. How would you set up a circuit to obtain NOT gate using a transistor?

Watch Video Solution

12. Explain why elemental semiconductor cannot be used to make visible LEDs.

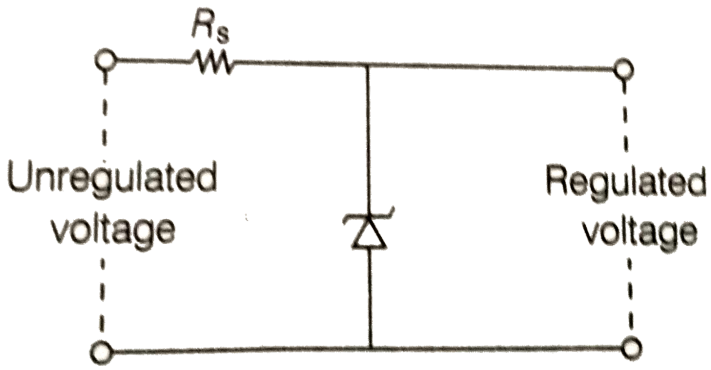
Watch Video Solution

13. Study the circuits shown in the figure. Name the gate that the given circuit resembles.



Watch Video Solution

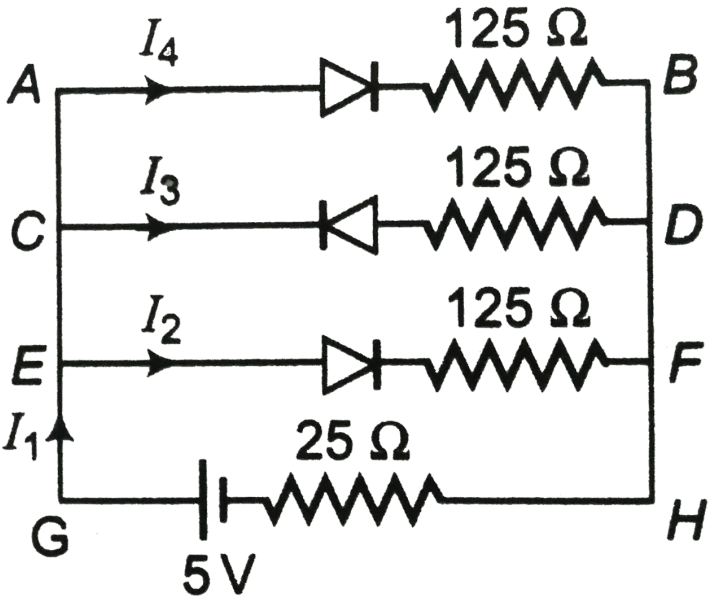
14. A Zener of power rating 1 W is to be used as a voltage regulator. If Zener has a breakdown of 5V and it has to regulate voltage which fluctuated between 3 V and 7 V, what should be the value of R_s for safe operation (see figure) ?



Watch Video Solution

Long Answer Type Question

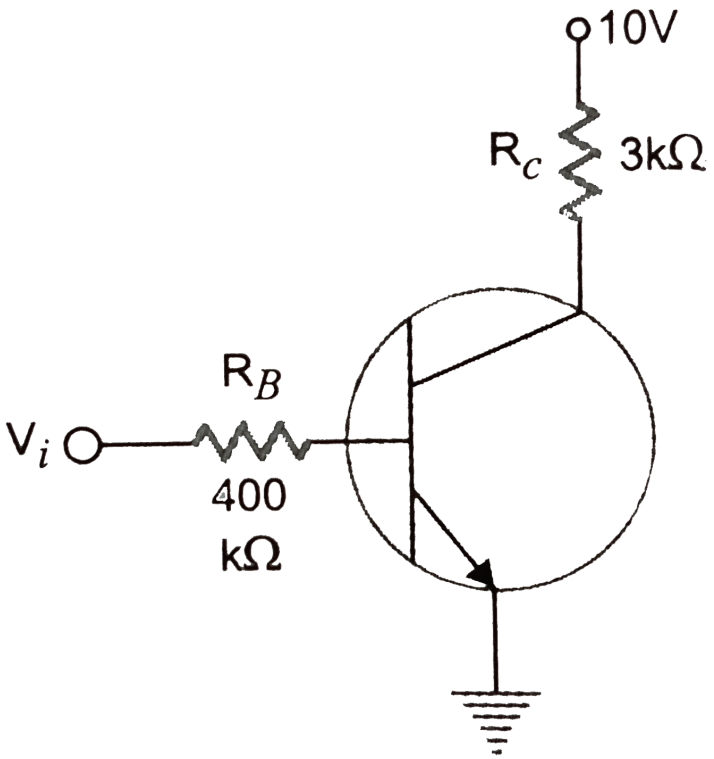
1. If each diode in figure has a forward bias resistance of 25 Omega and infinite resistance in reverse bias, what will be the values of the current I_1, I_2, I_3 and I_4?



Watch Video Solution

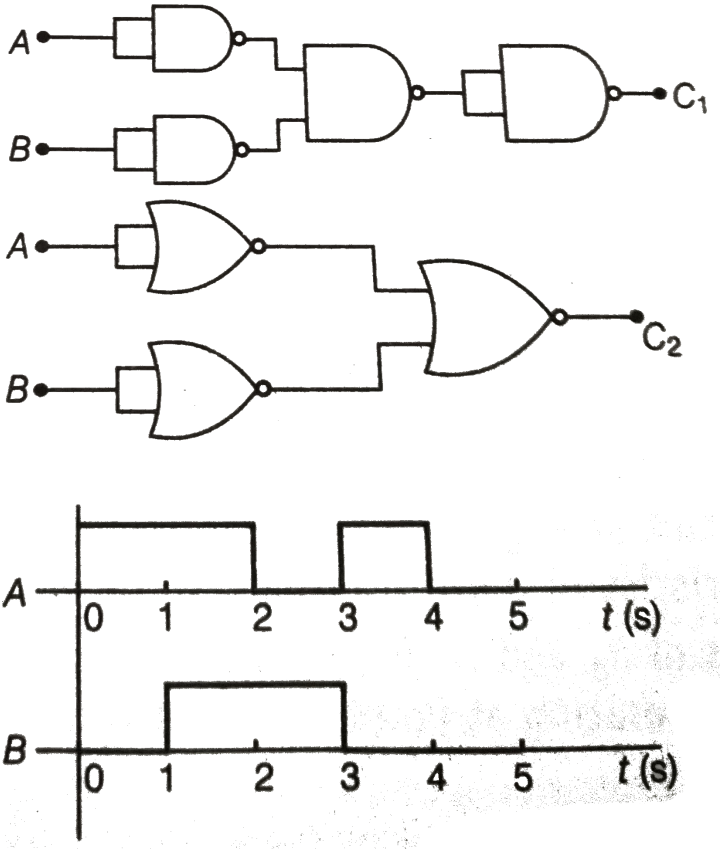
Watch Video Solution

2. In the circuit shown in Fig. when the input voltage of the base resistance is $10V$, V_{be} is zero and V_{ce} is also zero. Find the values of I, I and β.



Watch Video Solution

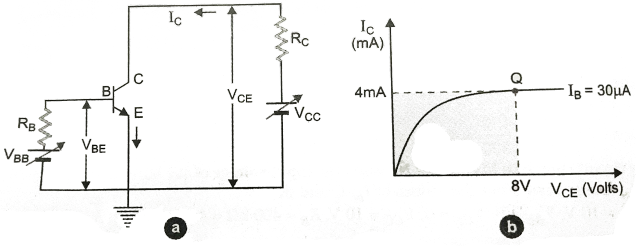
3. Draw the output signals C_1 and C_2 in the given combination of gates.



Watch Video Solution

4. Consider the circuit arrangnent shown in Fig. for studying input and output characteristics of npn transistor in CE configuration.

Select the values of R and R for a transistor whose $V_{BE} = 0.7V$, so that the transistor is operating at point Q as shown in the characteristics shown in Fig.



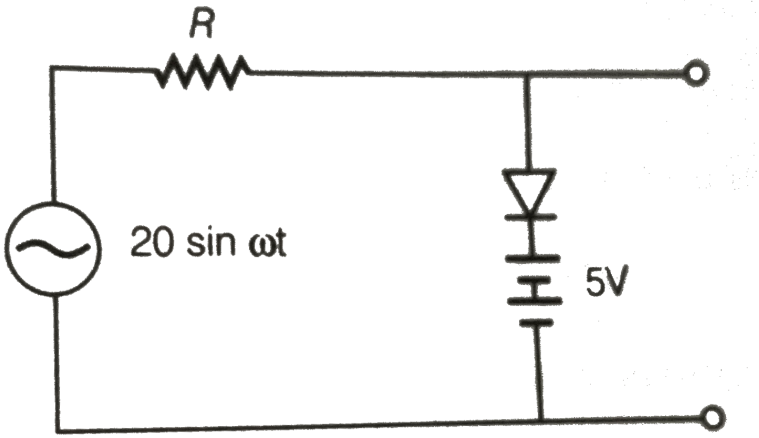
Given that the input impedance of the transistor is

very small and $V_{CC} = V_{BB} = 16V$, also find the voltage gain and power gain of circuit making appropriate assumptions.

Watch Video Solution

5. Assuming the ideal diode, draw the output waveform for the circuit given in fig. (a), explain

the waveform



Watch Video Solution

6. Suppose a 'n'- type wafer is created by doping Si crystal having $5 \times 10^{28} \text{atoms}/m^3$ with 1 ppm concentration of As. On the surfabe 200 ppm Boron is added to create 'p' region in this wafer.

Considering $n_i = 1.5 \times 10^{16} m^{-3}$, (i) Calculate the densities of the charge carriers in the n & p regions. (ii) Comment which charge carriers would contribute largely for the reverse saturation current when diode is reverse biased.

Watch Video Solution

7. An X-OR gate has following truth table:

It is represented by following logic relation

$y = \overline{A}.B + A.\overline{B}$

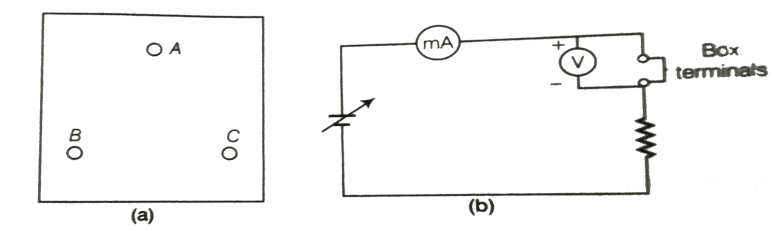
Build this gate using AND, OR and NOT gates.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

:

Watch Video Solution

8. Consider a box with three terminals on top of it as shown in figure.



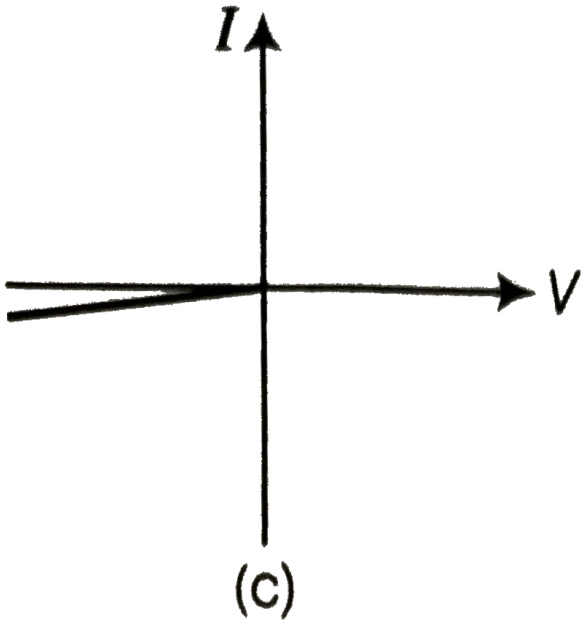
Three components namely, two germanium

diodes and one resistor are connected across these three terminals in some arrangement

A student performs an experiment in which any two of these three terminals are connected in the circuit shown in figure.

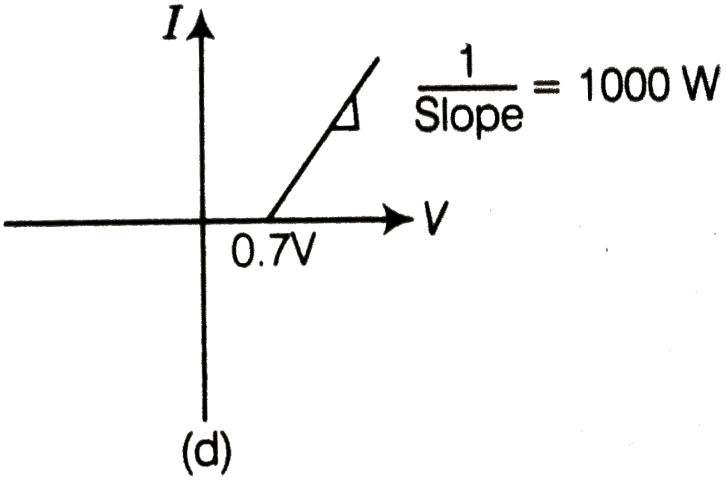
The student obtains graphs of current-voltage characteristics for unknown combination of components between the two terminals connected in the circuit. The graphs are

(i) When A is positive and B is negative



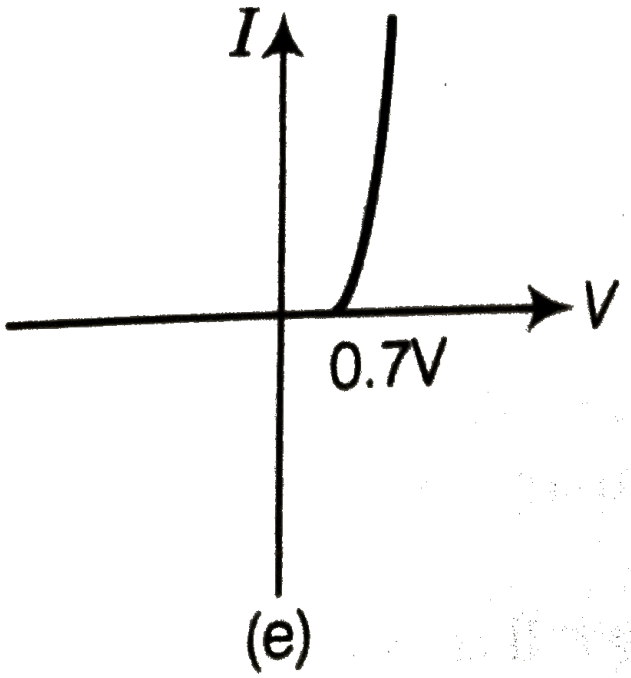
(c)

(ii) When A is negative and B is positive



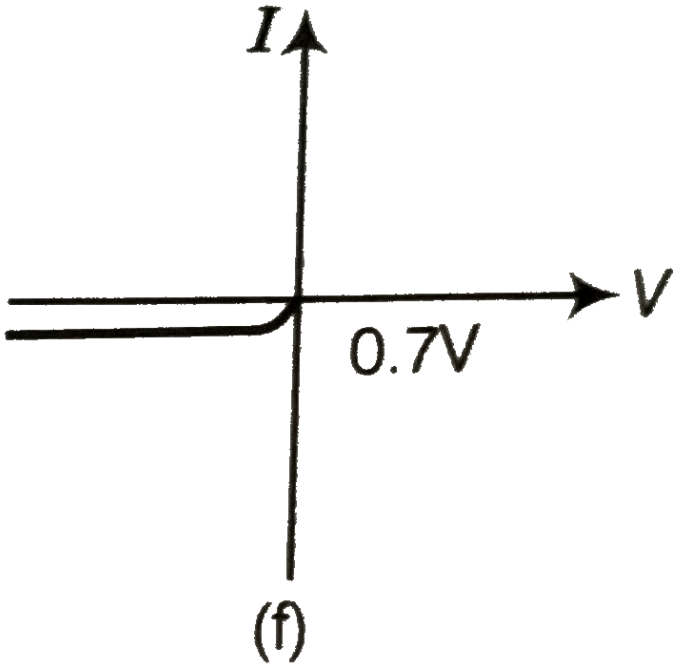
(d)

(iii) When B is negative and C is positve



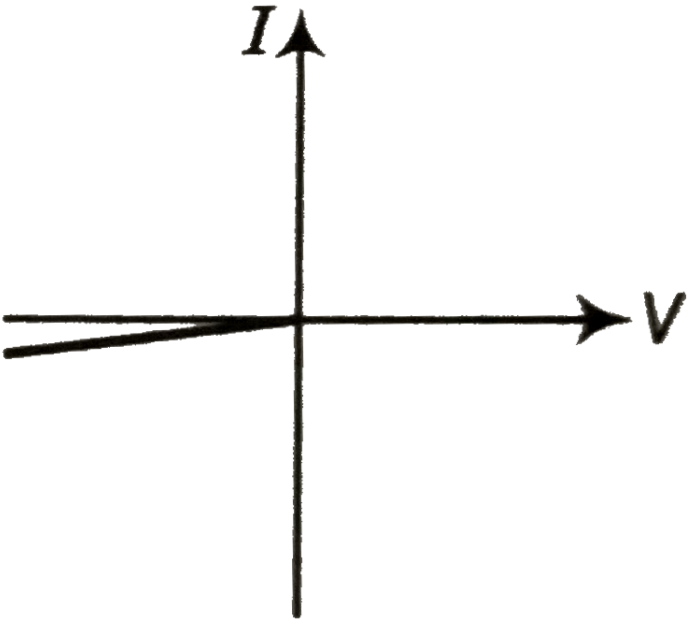
(e)

(iv) When B is positive and C is neagtive



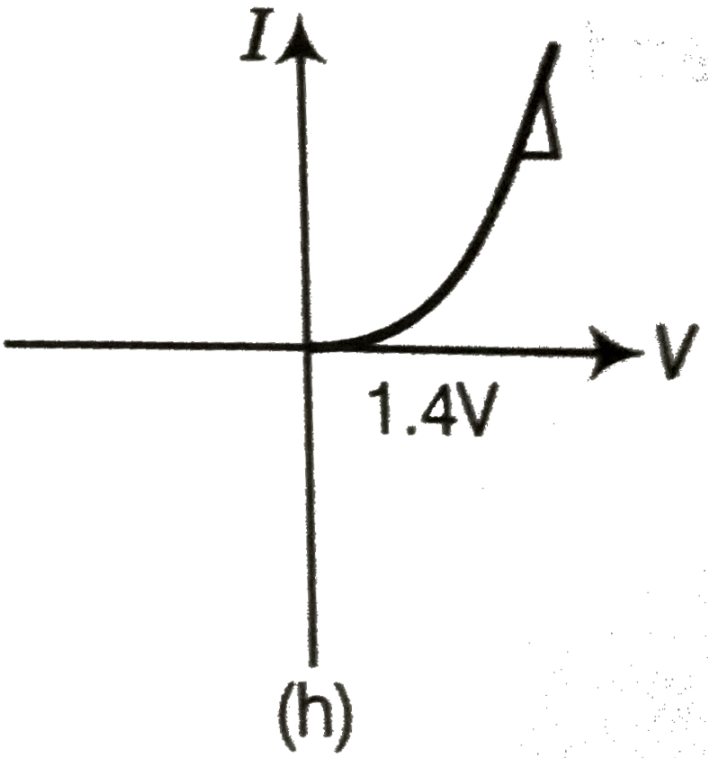
(f)

(v) When A is positive and C is negative



(g)

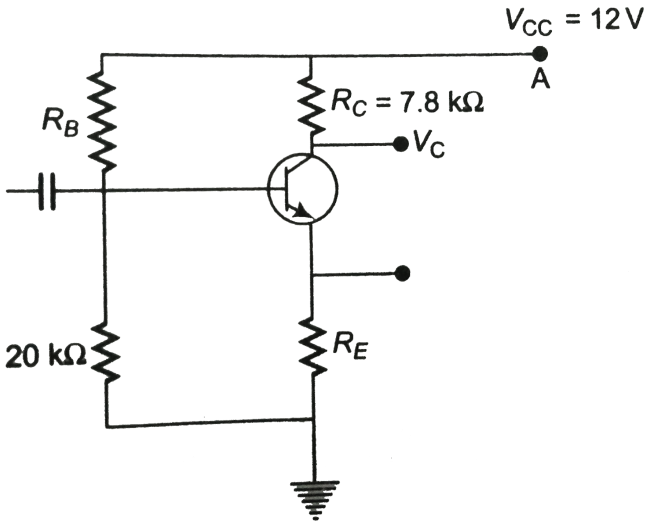
(vi) When A is negative and C is positive



From these graphs of current — voltage characteristic shown in fig. (c) to (h) determine the arrangement of components between A, B and C.

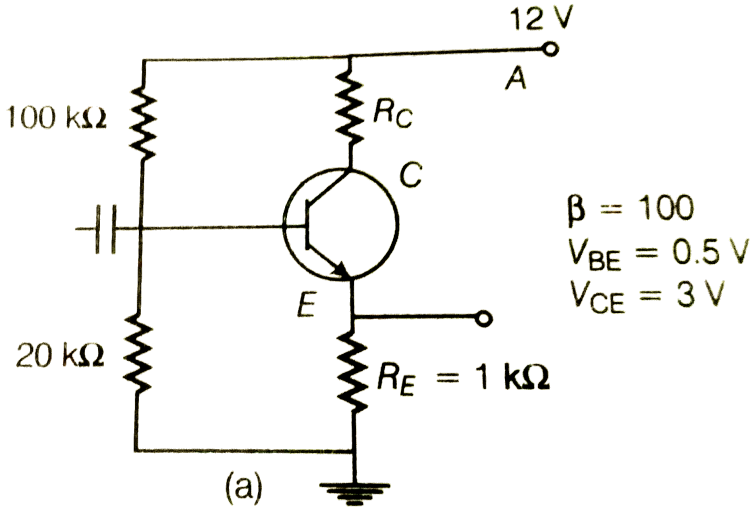
Watch Video Solution

9. For the transistor circuit shown in figure , evaluate V_E, R_B and R_E. Given $I_C = 1mA$, $V_{CE} = 3V$, $V_{BE} = 0.5V$, $V_{\mathbb{C}} = 12V$ and $\beta = 100$



Watch Video Solution

10. In the circuit shown in fig. (a), final the value of R_C.



Watch Video Solution