PHYSICS

AAKASH INSTITUTE ENGLISH

SEMICONDUCTOR ELECTRONICS: MATERIALS, DEVICES AND SIMPLE CIRCUITS

Solved Example

1. The energy gap of silicon is $1.14eV$. The maximum wavelength at which silicon will begin absorbing energy is

Watch Video Solution

2. In an intrinsic (pure) semiconductor, the number of conduction electrons is 7×10^{19} per cubic meter. Find the total number of current carriers (electrons & holes) in a same semiconductor of size 1 cm x 1 cm x 1mm.

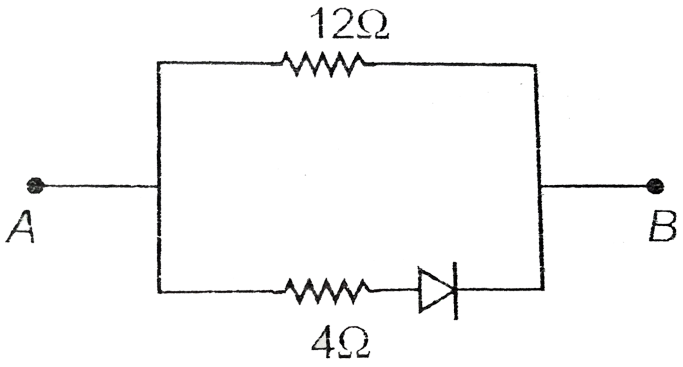
Watch Video Solution

3. Pure Si at 300 K has equal electron (n_e) and hole (n_h) concentration of $2. \times 10^{16}$ per m^3. Doping by indium increases n_h to 4×10^{22} per m^3. Calculate n_e in the doped silicon.

Watch Video Solution

4. Find the equivalent resistance of the network shown in the figure between the points A and B if

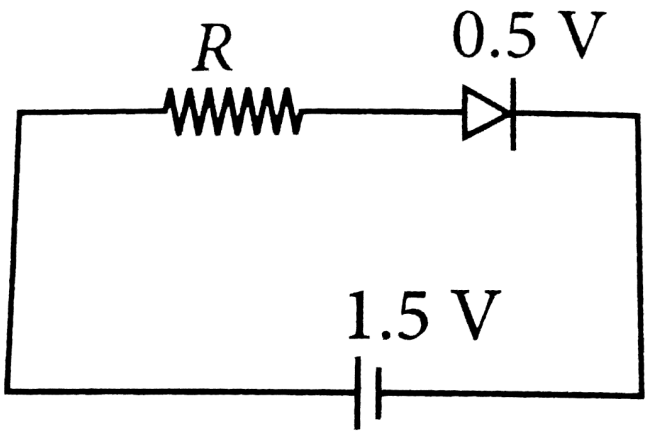
(i) $V_A > V_B$ (ii) $V_A < V_B$



Watch Video Solution

5. The diode used in the circuit shown in the figure has a constant voltage drop at 0.5 V at all currents and a maximum power rating of 100 mW. What should be the value of the resistor R, connected in series with diode, for

obtaining maximum current ?

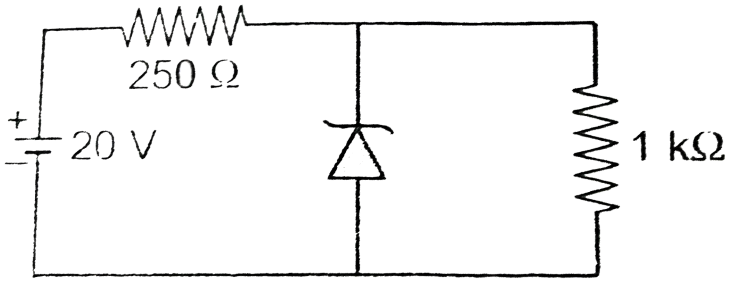


Watch Video Solution

6. In a half wave rectifier circuit operating from 50 Hz mains frequency, the fundamental frequency in the ripple would be

Watch Video Solution

7. A zener diode having breakdown voltage equal to 15V, is used in a voltage regulator circuit shown in figure. Find the current through the diode.



Watch Video Solution

8. A p-n photodiode is made of a material with a band gap of 2 e V. The minimum frequency of the radiation that can be absorbed by the material is nearly

(hc= 1240 eV nm)

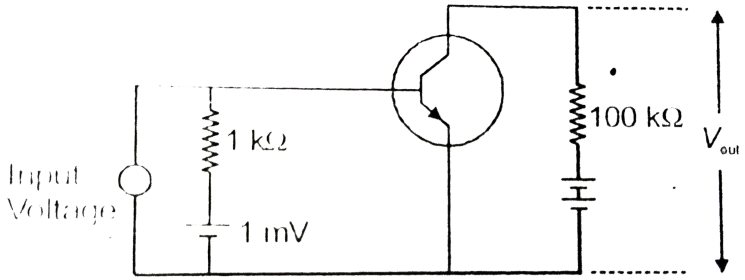
Watch Video Solution

9. A light-emitting diode (LED) has a voltage drop of 2V across it and passes a current of

$10\mu A$, when it operates with a 6V battery with a limiting resistor R. what is the value of R ?

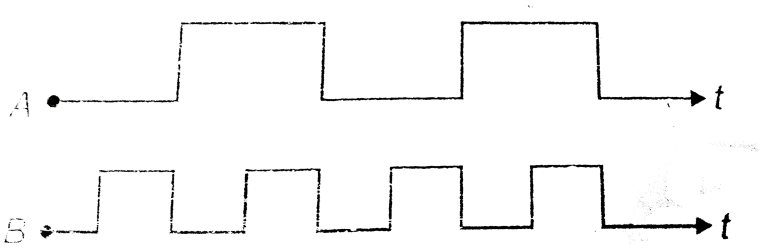
Watch Video Solution

10. In the following common emitter configuration an n-p-n transistor with current gain $\beta = 100$ is used. What is the output voltage of the amplifier ?



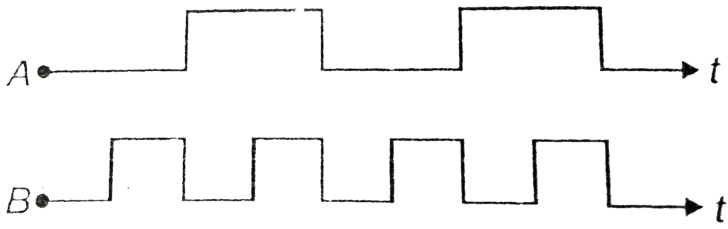
Watch Video Solution

11. Show the output waveform of OR gate for the following input waveforms of A and B



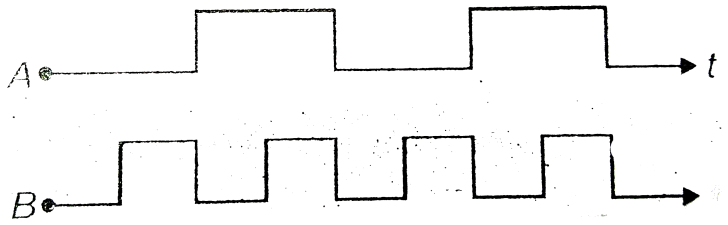
Watch Video Solution

12. show the output waveform of AND gate for the following input waveforms of A and B.



Watch Video Solution

13. Sketch the output waveform Y from a NAND gate having following inputs A and B

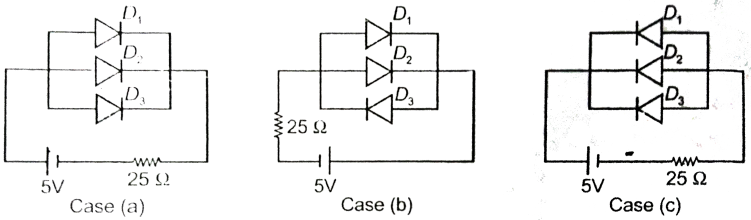


Watch Video Solution

14. Mobilities of electrons and holes for an intrinsic silicon is $0.64 m^2 V^{-1} S^{-1}$ and 0.36 $m^2 V^{-1} s^{-1}$ respectively. If the electron and hole densities are equal to $1.6 \times 10^{19} m^{-3}$. What is the conductivity of silicon ?

Watch Video Solution

15. Determine the current through the resistor for following circuits

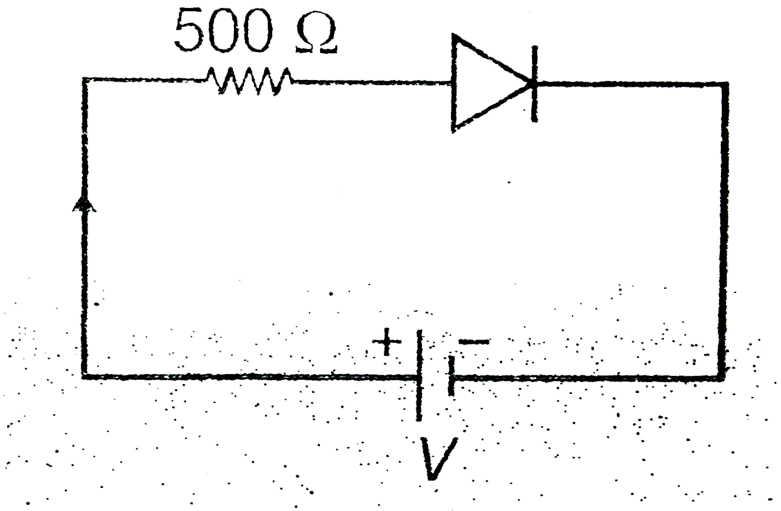


Watch Video Solution

16. When the voltage drop across a p-n junction is increased from 0.80 V to 0.82 V, the change in the diode current is 20 mA. What is the dynamic resistance of the diode ?

Watch Video Solution

17. In the given circuit the voltage drop across the diode is 0.8 V, if the diode can withstand current upto maximum of 30 mA, then find the maximum voltage of the battery



Watch Video Solution

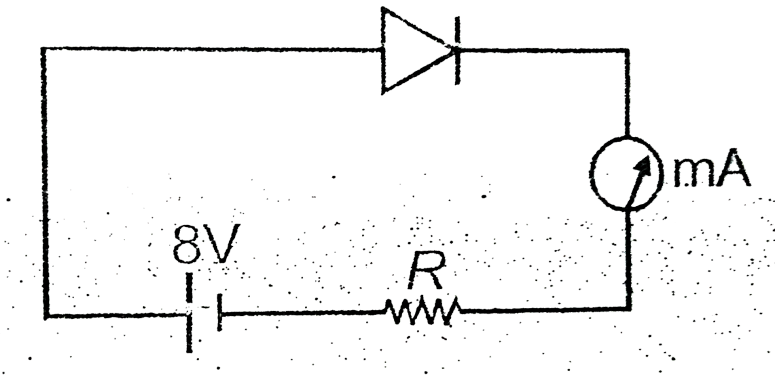
18. In a p-n junction, the thickness of depletion region is $2 \times 10^{-7} m$ and potential barrier across the junction is 0.20 V

What will be the intensity of electric field in this region ?

Watch Video Solution

19. In the given circuit a silicon diode with knee voltage 0.7V is forward biased with a battery of e.m.f 8V. The current in the circuit is 40 mA.

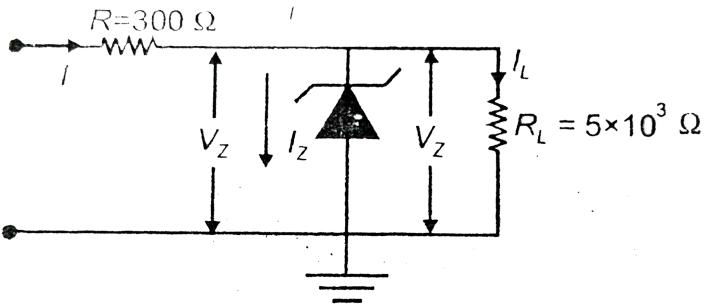
Find the power drop at resistor R and diode.



Watch Video Solution

20. In the given figure, what is the voltage needed to maintain 25V across the load resistance R_L, if Zener diode required a minimum current of 20 mA to work

satisfactorily ?



Watch Video Solution

21. A transistor is used in CE mode in an amplifier circuit. When a signal of 40 mV is added to base-emitter voltage, the base current changes by $40\mu A$ and collector by 6mA. The load resistance is $10k\Omega$. Calculate

(i) The current gain β

(ii) The input resistance R_{BE}

Watch Video Solution

22. A transistor has $\alpha = 0.90$, the emitter current is 15mA, what is

(a) The collector current ?

(b) The base current ?

(c) Gain β ?

Watch Video Solution

23. The current gain $\beta = 100$ and base current is $25\mu A$. Calculate emitter current.

Watch Video Solution

Try Yourself

1. In semiconductors at a room temperature

A. Valence band is partially empty and the conduction band is partially filled

B. Valence band is completely filled and the conduction band is partially empty

C. Valence band is completely filled

D. Conduction band is completely empty

Answer:

Watch Video Solution

2. Carbon, silicon and germanium have four valence electrons each. These are characterised by valence and conduction

bands separated by energy band gap respectively equal to $(E_g)_C$, $(E_g)_{Si}$, and $(E_g)_{Ge}$. Which of the following statements is true?

A. $(E_g)_C > (E_g)_{Si}$

B. $(E_g)_C = (E_g)_{Si}$

C. $(E_g)_C < (E_g)_{Ge}$

D. $(E_g)_C < (E_g)_{Si}$

Answer:

Watch Video Solution

3. In a pure semiconductor the number of conduction electrons is 6×10^{19}per cubic metre.How many holes are there in a sample of size $1cm \times 1cm \times 1mm$?

Watch Video Solution

4. C, Si and Ge have same lattice structure. Why is C insulator while Si and Ge intrinsic semiconductors?

Watch Video Solution

5. A semiconductor is known to have an electron concentration of 6×10^{12} per cubic centimeter and a hole concentration of 8×10^{13} per cubic centimeter. Is this semiconductor N-type or P-type ?

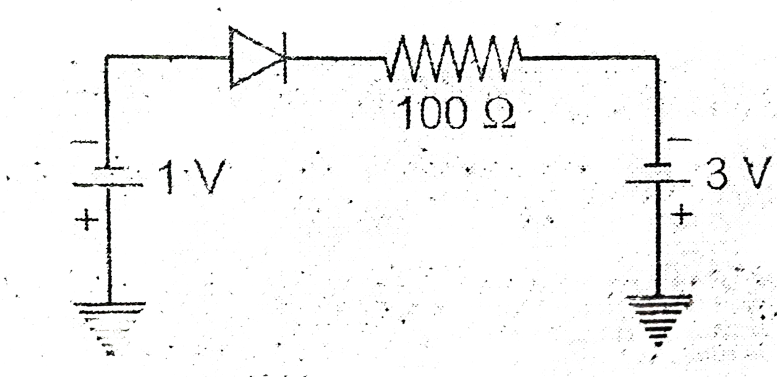
Watch Video Solution

6. Suppose a pure Si crystal has 5×10^{28} atoms m^{-3}. It is doped by 1 ppm

concentration of pentavalent As. Calculate the number of electrons and holes. Given that $n_i = 1.5 \times 10^{16} m^{-3}$.

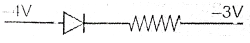
Watch Video Solution

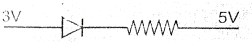
7. What is the current through an ideal p-n junction diode shown in figure below ?

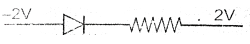


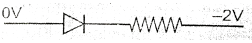
Watch Video Solution

8. Out of following which one is a forward biased diode

A. 

B. 

C. 

D. 

Answer:

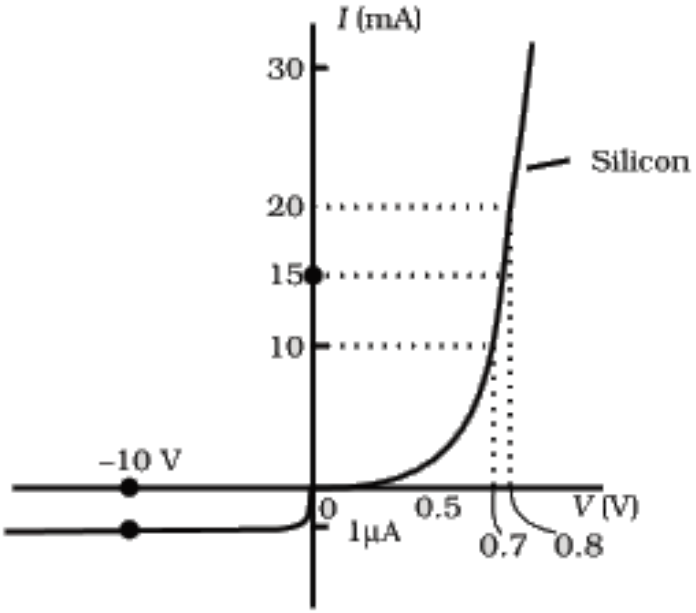
Watch Video Solution

9. Can we take one slab of p-type semiconductor and physically join it to another n-type semiconductor to get p-n junction?

Watch Video Solution

10. The V-I characteristic of a silicon diode is shown in the Fig. 14.17. Calculate the resistance of the diode at (a)

$I_D = 15mA$ and $(b) V_D = -10V.$



Watch Video Solution

11. Freuency of given AC signal is 50 Hz. When it connected to a half - wave rectifier, then

what is the number of output pulses given by rectifier within one second ?

Watch Video Solution

12. What is the output form of full-wave rectifier ?

Watch Video Solution

13. In a Zener regulated power supply a Zener diode with $V_Z = 6.0$ V is used for regulation.

The load current is to be 4.0 mA and the unregulated input is 10.0 V. What should be the value of series resistor R_S?

Watch Video Solution

14. The current in the forward bias is known to be more (-mA) than the current in the reverse bias $(-\mu A)$. What is the reason, then, to operate the photodiode in reverse bias ?

Watch Video Solution

15. Why are Si and GaAs are preferred materials for solar cells?

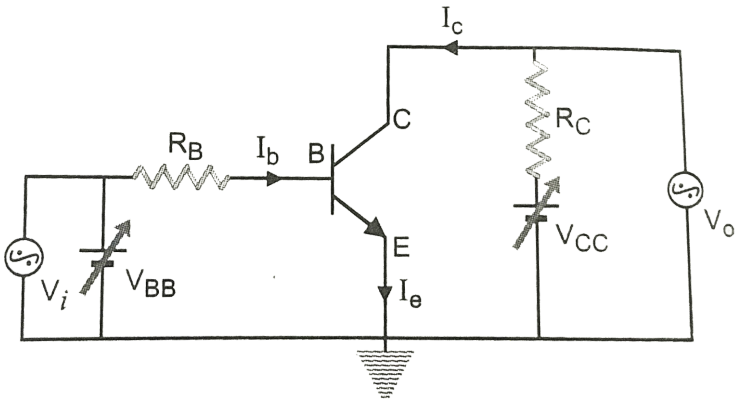
Watch Video Solution

16. For a CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is $2V$. Suppose the current amplification factor of the transistor is 100. The value of R_B in series with V_{BB} supply of $2V$, if the DC base current has to be 10 times the signal current is.

Watch Video Solution

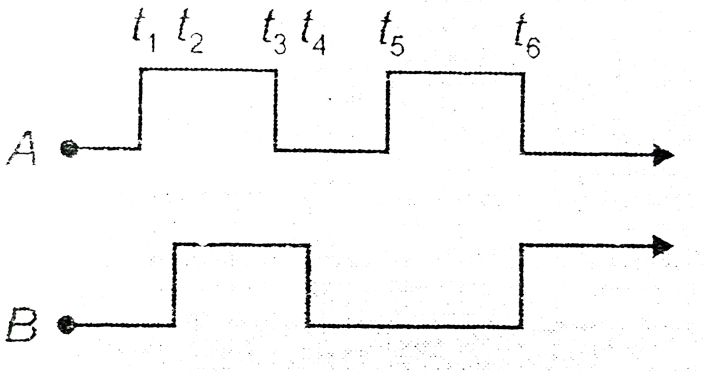
17. In common emitter transistor as shown in Fig., the V_{BB} supply can be varied from 0 V to 5.0V. The Si. Transistor has $\beta_{ac} = 250$ and $R_B = 100k\Omega, R_c = 1k\Omega, V_{CC} = 5.0V.$ Assume that when the transistor is saturated, $V_{CE} = 0V$ and $V_{BE} = 0.8V.$ Calculate the minimum base current, for which the transistor will reach saturation. Hence, determine V_i when the transistor is 'switched on' find ranges of V_i for which the transistor is

switched off and switched on.



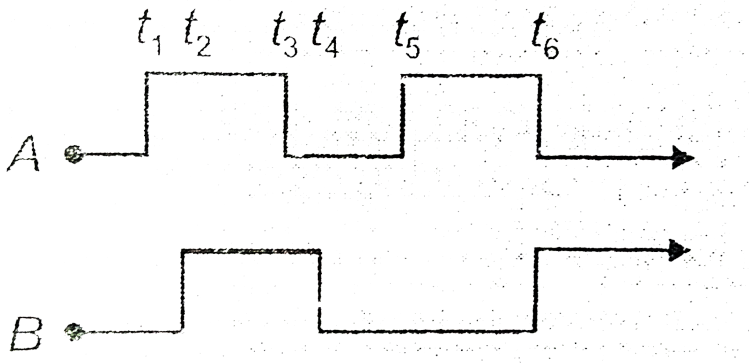
Watch Video Solution

18. Show the output waveform of OR gate for the following input waveforms of A and B



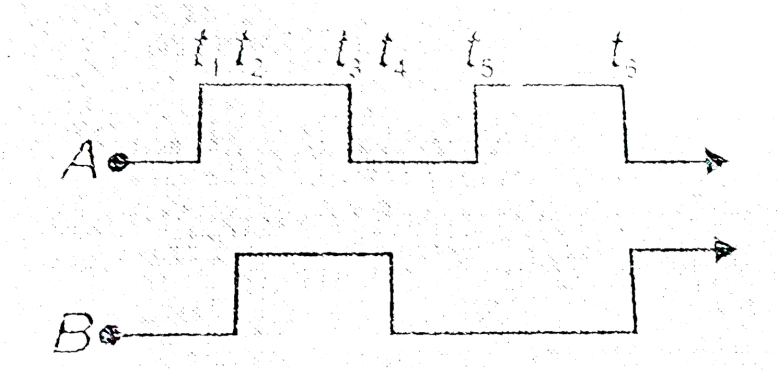
Watch Video Solution

19. Sketch the output waveform obtained from AND gate for the following inputs A and B.



Watch Video Solution

20. Sketch the output wavefrom Y from a NAND gate having following inputs A and B



Watch Video Solution

Assignment Section A Objective Type Question One Option Is Correct

1. Silicon is a semiconductor. If a small amount of As is added to it, then its electrical conductivity

A. Decreases

B. Increases

C. Remains unchanged

D. Becomes zero

Answer: B

Watch Video Solution

2. The mobility of free electrons is greater then that of free holes because

A. Carry negative charge

B. Are light

C. Mutually collide less

D. Require low energy to continue their motion

Answer: D

 Watch Video Solution

3. Carbon , silicon and germanium have four valence electrons each . At room temperature which one of the following statements is most appropriate ?

A. The number of free conduction electrons is negligibly small in all the three

B. The number of free conduction electrons for conduction is significant in all the three

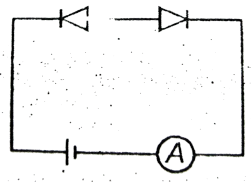
C. The number of free electrons for conduction is significant only in Si and Ge but small in C

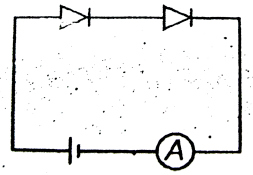
D. The number of free electrons for conduction is significant in C but small in Si and Ge

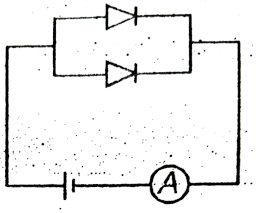
Answer: C

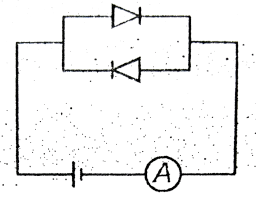
 Watch Video Solution

4. Which circuit will not show current in ammeter ?

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

5. A p-n photodiode is made of a material with a band gap of 2 e V. The minimum frequency of the radiation that can be absorbed by the material is nearly

(hc= 1240 eV nm)

A. $1 \times 10^4 Hz$

B. $20 \times 10^{14} Hz$

C. $10 \times 10^{14} Hz$

D. $5 \times 10^{14} Hz$

Answer: D

Watch Video Solution

6. Zener breakdown takes place if

A. Doped impurity is low

B. Doped impurity is high

C. Less impurity in N-part

D. Less impurity in p-type

Answer: B

Watch Video Solution

7. In the depletion region of an unbiased p-n junction diode there are

A. Only electrons

B. Only fixed ions

C. Only holes

D. Both electrons and holes

Answer: B

Watch Video Solution

8. Function of rectifier is

A. To convert ac into dc

B. To convert dc into ac

C. Both (1) and (2)

D. None of these

Answer: A

 Watch Video Solution

9. In a p–n junction photo cell, the value of the photo electromotive force produced by monochromatic light is proportional to: -

A. Voltage applied at the p-n junction

B. Barrier voltage at the p-n junction

C. Intensity of light falling on the cell

D. Frequency of light falling on the cell

Answer: C

Watch Video Solution

10. Serious draw back of the semiconductor device is

A. Are costly

B. Do not last for long time

C. Pollute the environment

D. Cannot be used with high voltage

Answer: D

Watch Video Solution

11. The reason of current flow in $P-N$ junction forward biase is

A. A. Drifting of charge carriers

B. B. Diffusion of charge carriers

C. C. Minority charge carriers

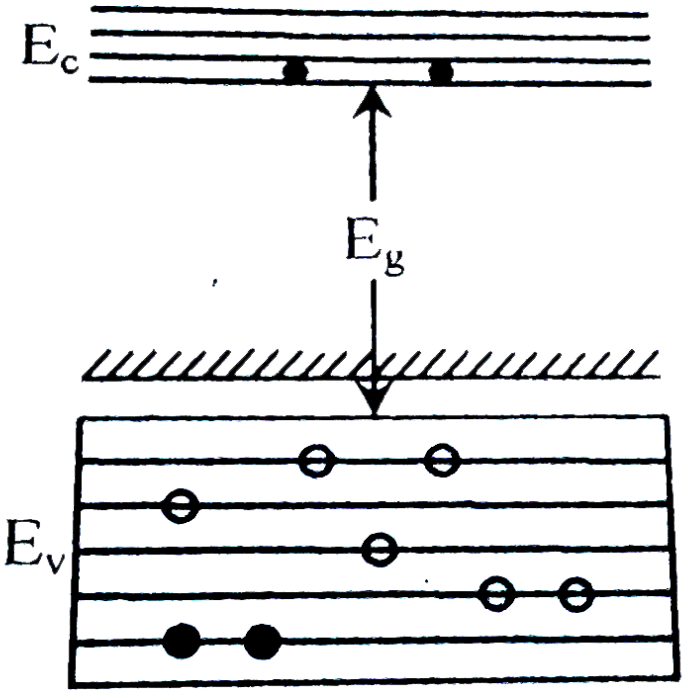
D. D. All of these

Answer: B

Watch Video Solution

12. In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The

material is:-



A. A p-type semiconductor

B. An n-type semiconductor

C. An insulator

D. A metal

Answer: A

Watch Video Solution

13. An oscillator is nothing but an amplifier with

A. No feedback

B. Negative feedback

C. Positive feedback

D. Large gain

Answer: C

Watch Video Solution

14. When a n-p-n transistor is used as an amplifier, then

A. Electrons move from base to collector

B. Holes move from emitter to base

C. Electrons move from collector to base

D. Holes moves from base to emitter

Answer: b

Watch Video Solution

15. If l_1, l_2, l_3 are the lengths of the emitter, base and collector of a transistor then

A. $l_1 = l_2 = l_3$

B. $l_3 < l_1 < l_2$

C. $l_3 > l_1 > l_2$

D. $l_3 < l_2 < l_1$

Answer: C

Watch Video Solution

16. A common emitter amplifier gives an output of 3 V for an input of 0.01 V. If β of the resistance is 100 and the input resistance is $1k\Omega$. then the collector resistance is

A. $30k\Omega$

B. $3k\Omega$

C. $1k\Omega$

D. $6k\Omega$

Answer: B

Watch Video Solution

17. In a common base amplifier the phase difference the input signal voltage and the output voltage is

A. $\frac{\pi}{2}$

B. zero

C. $\frac{\pi}{6}$

D. π

Answer: D

Watch Video Solution

18. In a common emitter amplifier the input signal is applied across

A. Any where

B. Emitter-collector

C. Collector-base

D. Base - emitter

Answer: D

Watch Video Solution

19. The concentration of impurities in a transistor is

A. Largest for base region

B. Largest for emitter region

C. Least for emitter region

D. Equal for the emitter, base and collector region

Answer: B

Watch Video Solution

20. In a transistor, the collector current is always · less then the emitter current because -

A. Collector side is reverse biased and the emitter side is forward biased

B. Collector being reverse biased, attracts the electrons

C. A few electrons are lost in the base and only remaining one's reach the collector

D. Collector side is forward biased and emitter side is reverse biased

Answer: C

Watch Video Solution

21. The minimum potential difference between the base and emitter required to switch a silicon transistor ON is approximately?

A. 1V

B. 3V

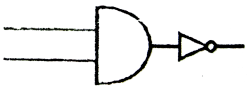
C. 5V

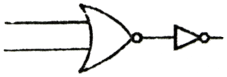
D. 4.2V

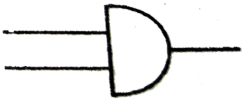
Answer: A

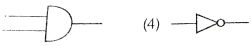
Watch Video Solution

22. Which of the following represents NAND gate ?

A. 

B. 

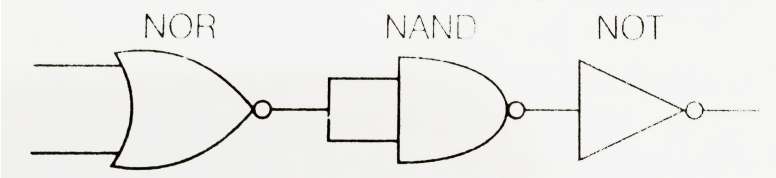
C. 

D. 

Answer: A

Watch Video Solution

23. The circuit is equivalent to



A. NOR gate

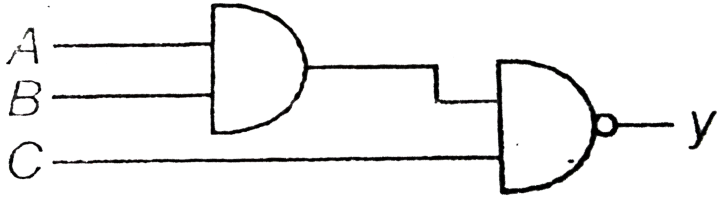
B. OR gate

C. AND gate

D. NAND gate

Answer: A

Watch Video Solution



24.

The output y, when all three inputs are first high and then low, will respectively be

A. 1,1

B. 0,1

C. 0,0

D. 1,0

Answer: B

Watch Video Solution

25. A silicon specimen is made into a P-type semiconductor by dopping, on an average, one helium atoms per 5×10^7 silicon atoms. If the number density of atoms in the silicon specimen is $5 \times 10^{28} atom/m^3$ then the number of acceptor atoms in silicon per cubic centimeter will be

A. 2.5×10^{30}

B. 2.5×10^{35}

C. 1.0×10^{13}

D. 1.0×10^{15}

Answer: D

Watch Video Solution

26. Consider the junction diode is ideal. The value of current through the resistance of

300Ω is

A. 0.001 A

B. 0.1A

C. 0.01A

D. zero

Answer: D

Watch Video Solution

27. Negative feedback

A. Increases stability

B. Decreases stability

C. Produce oscillation

D. Stops current in the transistor

Answer: A

 Watch Video Solution

28. The current obtained from a simple filterless rectifier is

A. Constant direct current

B. Varying direct current

C. Half current

D. Eddy current

Answer: B

Watch Video Solution

29. In a p-n junction depletion region has a thickness of the order of

A. $10^{-12}m$

B. $10^{-6}m$

C. $10^{-3}m$

D. $10^{-2}m$

Answer: B

Watch Video Solution

30. In a properly biased transistor-

A. Both depletion layers are equally large

B. Both depletion layers are equally small

C. Emitter base depletion layer is large but base collector depletion layer is small

D. Emitter base depletion layer is small but base collector depletion layer is large

Answer: D

 Watch Video Solution

31. In an n-p-n transistor, the collector current is 10 mA. If 90% of the electrons emitted reach the collector, then the emitter current will be

A. 9mA

B. 11mA

C. 1 mA

D. 0.1 mA

Answer: B

 Watch Video Solution

32. Application of forward bias to p-n junction

A. Widens the depletion zone

B. Increases the number of donors on the n-sides

C. Increases the potential difference across the depletion zone

D. Increases the electric filed in the positive depletion zone

Answer: B

 Watch Video Solution

33. Intrinsic semiconductor at absolute zero temperature is a

A. Good conductor

B. Good semiconductor

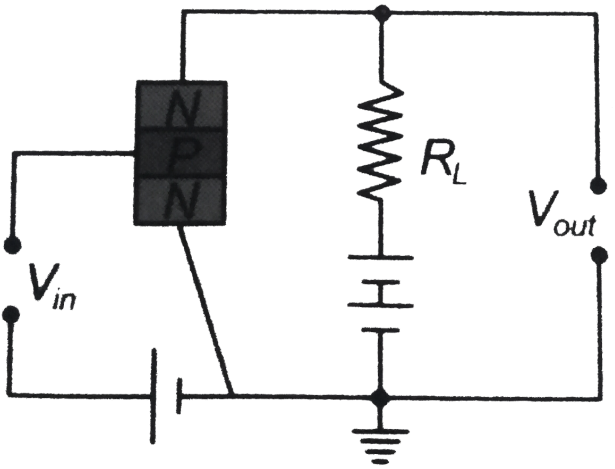
C. Perfect insulator

D. Perfect conductor

Answer: C

Watch Video Solution

34. An NPN-transistor circuit is arranged as shown in figure. It is



A. Base amplifier circuit

B. Emitter amplifier circuit

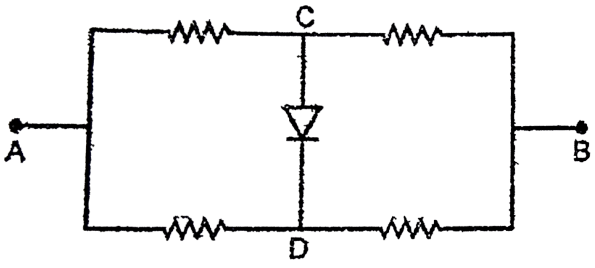
C. Collector amplifier circuit

D. none of these

Answer: B

Watch Video Solution

35.



Four equal resistors, each of resistance 10

ohm are connected as shown in the adjoining circuit diagram. Then the equivalent resistance between points A and B is-

A. 5Ω

B. 10Ω

C. 20Ω

D. 40Ω

Answer: B

Watch Video Solution

36. In a semiconducting material the mobilities of electrons and holes are μ_e and μ_h respectively. Which of the following is true?

A. $\mu_e > \mu_h$

B. $\mu_e < \mu_h$

C. $\mu_e = \mu_h$

D. $\mu_e < 0, \mu_h > 0$

Answer: A

Watch Video Solution

37. Which of the following gate is called universal gate

A. OR

B. NOT

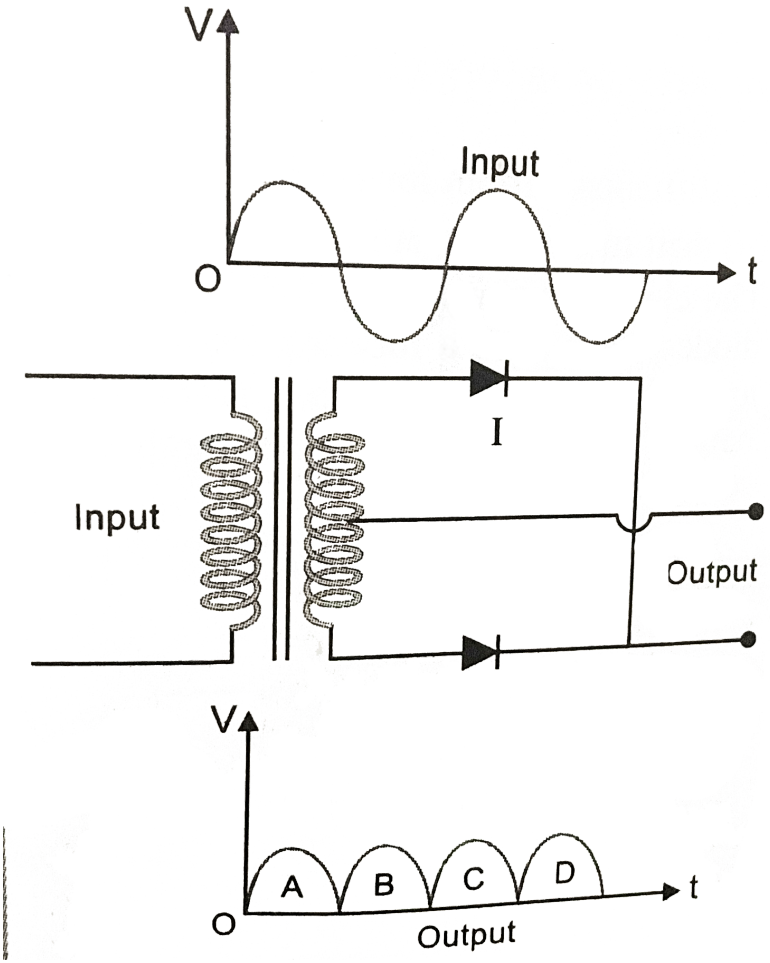
C. AND

D. NOR

Answer: D

Watch Video Solution

38. A full wave rectifier circuit along with the input and output are shown in Fig. the concentrations from the diode I is (are)



A. C

B. A,C

C. B,D

D. A,B,C,D

Answer: B

Watch Video Solution

39. In a $p-n$ junction diode having depletion layer of thickness $10^{-6}m$, the potential across it is $0.1V$. The electric field produced is

A. $10^7 Vm^{-1}$

B. $10^{-6} Vm^{-1}$

C. $10^5 Vm^{-1}$

D. $10^{-5} Vm^{-1}$

Answer: A

Watch Video Solution

40. What is the voltage gain in a common emitter amplifier, where output resistance is 3Ω and load resistance is $24\Omega(\beta = 0.6)$?

A. 8.4

B. 4.8

C. 2.4

D. 480

Answer: B

 Watch Video Solution

41. Barrier potential of a p-n junction diode does not depend on -

A. Doping denisty

B. Temperature

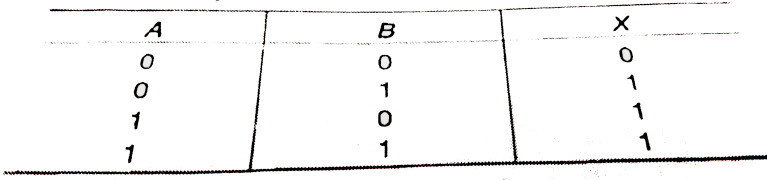
C. Forward bias

D. Diode design

Answer: D

Watch Video Solution

42. The following truth table corresponds to the logic gate



A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

A. OR gate

B. AND gate

C. NAND gate

D. NOR gate

Answer: B

Watch Video Solution

43. Which of the following is not equal to 1 in Boolean algebra ?

A. A+1

B. $A + \overline{A}$

C. $\overline{A . \overline{A}}$

D. $A . \overline{A}$

Answer: D

Watch Video Solution

44. Potential barrier developed in a junction diode opposes the flow of

A. Free electrons in n-side and holes in p-side

B. free electrons in p-side and holes in n-side

C. Only free electrons in n-side

D. Only holes in p-side

Answer: A

Watch Video Solution

45. Which of the following diodes is used in unbiased condition ?

A. Zener diode

B. Photo diode

C. Solar cell

D. LED

Answer: C

Watch Video Solution

46. Which of the following materials can be used for making solar cell ?

A. Iron

B. copper

C. Lead ziconate

D. Gallium arsenide

Answer: D

Watch Video Solution

47. If a full wave rectifier circuit is operating from $50Hz$ mains, the fundamental frequency in the ripple frequency will be

A. 50 Hz

B. 100 Hz

C. 25 Hz

D. 70 Hz

Answer: B

 Watch Video Solution

48. A transistor cannot be used as an

A. Amplifier

B. Oscillator

C. Modulator

D. Rectifier

Answer: D

 Watch Video Solution

49. The P-N junction is-

A. Ohmic - resistance

B. Non-ohmic resistance

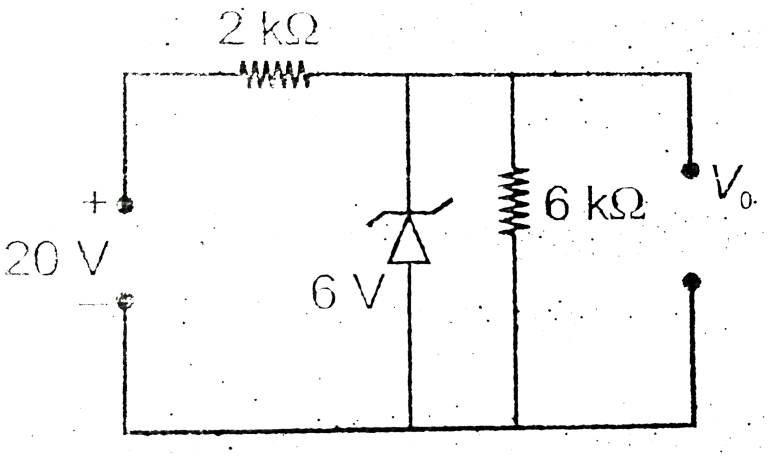
C. Negative resistance

D. Positive resistance

Answer: B

 Watch Video Solution

50. What is the value of output voltage V_0 in the circuit shown in the figure ?



A. 6V

B. 14V

C. 20 V

D. 26 V

Answer: A

Watch Video Solution

Assignment Section B Objective Type Question One Option Is Correct

1. An n-type semi- conductor is

A. Positively charged

B. Negatively charged

C. Either positively charged or negatively charged

D. Electrically neutral

Answer: D

Watch Video Solution

2. In a common base amplifier the phase difference the input signal voltage and the output voltage is

A. Zero

B. $\pi / 4$

C. $\pi / 2$

D. π

Answer: D

Watch Video Solution

3. The zener diode can be used as

A. An amplifier

B. An oscillator

C. Rectifier

D. Voltage stabilizer

Answer: D

Watch Video Solution

4. In order to obtain amplifying action from a transistor , the transistor should be used in

A. Cut-off state

B. Saturation state

C. Active state

D. None of these

Answer: C

Watch Video Solution

5. In the cut-off state of the transistor,

A. Input circuit is forward biased and output circuit is reverse biased

B. Input circuit is reverse biased and output circuit is forward biased

C. Both input as well as output circuits are reverse biased

D. Both input as well as output circuits are forward biased

Answer: C

Watch Video Solution

6. In which of the configuration of a transistor , the power gain is highest ?

A. Common base

B. Common emitter

C. Common collector

D. Same in all the three

Answer: B

Watch Video Solution

7. The emitter region in a PNP-junction transistor is more heavily doped than the base region, so that

A. The flow across the base region will be only because of electrons

B. The flow across the base region will be only because of holes

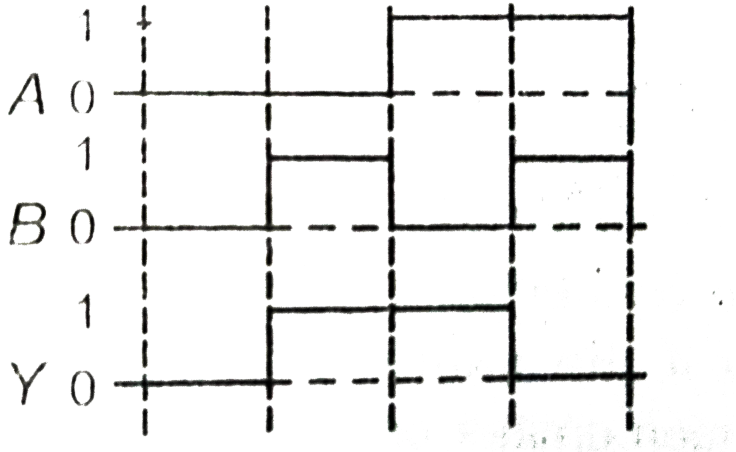
C. Recombination will be decreased in the base region

D. Base current will be high

Answer: C

Watch Video Solution

8. There is a gate with two inputs A and B, and one output Y. using the input and output wave forms identify the gate



A. NAND

B. NOR

C. EXCLUSIVE-OR

D. AND

Answer: C

Watch Video Solution

9. In a P-N junction , for a 0.2 V change in the forward bias voltage, the corresponding

change in current is 20 mA. The dynamic resistance of the P-N junction is

A. 30Ω

B. 10Ω

C. 40Ω

D. 20Ω

Answer: B

Watch Video Solution

10. An n-type semiconductor has donor levels at 500 meV above the valence band, the frequnecy of light required to create a hole is nearly

A. $8 \times 10^{13} Hz$

B. $12 \times 10^{13} Hz$

C. $22 \times 10^{13} Hz$

D. $15 \times 10^{13} Hz$

Answer: B

Watch Video Solution

Watch video solution

11. In a common emitter amplifier , when a signal of 40 mV is added to the input voltage, the base current changes by $100\mu A$ and emitter current changes by 2.1mA the trans-conductance is

A. $\frac{1}{20}\Omega^{-1}$

B. $\frac{1}{50}\Omega^{-1}$

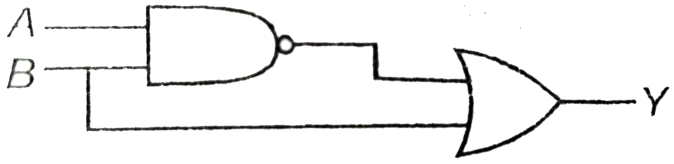
C. $50\Omega^{-1}$

D. $15\Omega^{-1}$

Answer: A

Watch Video Solution

12. The output of the given logica gate is



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

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

C. Y=1

D. $Y = \left(\overline{A} + \overline{B}\right)\overline{B}$

Answer: C

Watch Video Solution

13. Two identical capacitors A and B are charged to the same potential V and are connected in two circuits at t=0 as shown in figure.The charges on the capacitor at a time $t = CR$ are, respectively,

A. VC,VC

B. VC/e,VC

C. VC,VC/e

D. VC/e,VC/e

A. VC,VC

B. VC/e,VC

C. VC,VC/e

D. VC/e,VC/e

Answer: B

Watch Video Solution

14. The relationship between α and β is given by

A. $\alpha = \beta$

B. $\alpha = \frac{1}{\beta}$

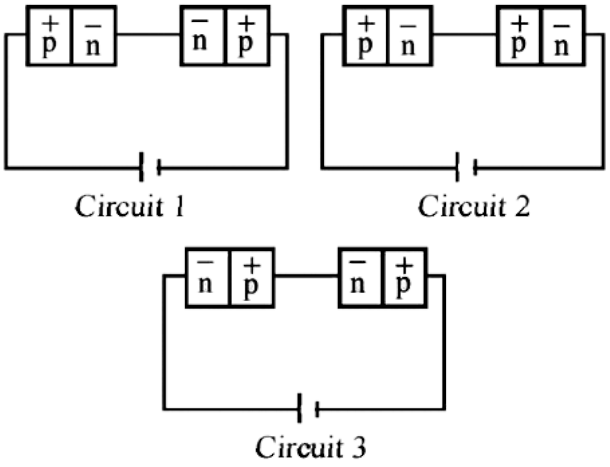
C. $\beta = \frac{\alpha}{1 - \alpha}$

D. $\beta = \frac{\alpha}{1 + \alpha}$

Answer: C

Watch Video Solution

15. Two identical p-n junctions may be connected in series in which a battery in three ways , fig . The potential drops across the two p - n junctions are equal in



A. First and second circuits

B. Second and third circuits

C. Third and first circuits

D. All of these

Answer: B

Watch Video Solution

16. In a silicon transistor, a change of $7.89mA$ in the emitter current produce a change of 7.8 mA in the collector current. What change in the base current is necessary to produce an equivalent change in the collector current?

A. 7.8 mA

B. 7.89 mA

C. 0.09 mA

D. zero

Answer: C

Watch Video Solution

17. In a doped semiconductor, the impurity level is 40 meV above the valence band. The semicoductor is

A. n-type

B. p-type

C. intrinsic

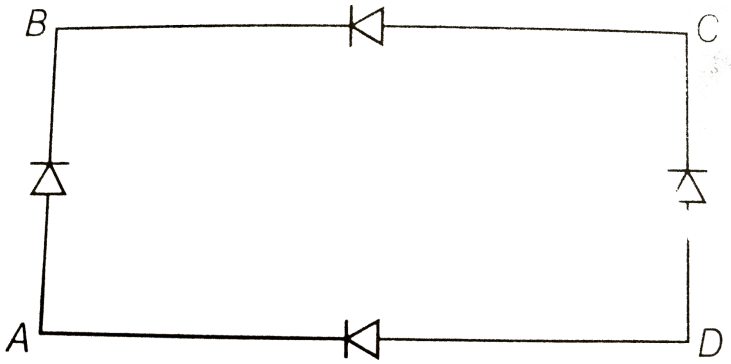
D. extrinsic

Answer: B

Watch Video Solution

18. In figure the input is across the terminals A and C and the output is across B and D. Then

the output is



A. Zero

B. Same as input

C. Full wave rectified

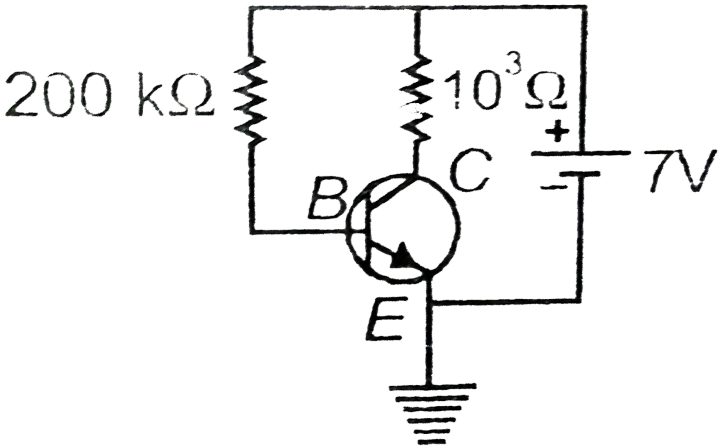
D. Half wave rectified

Answer: C

Watch Video Solution

19. In the given figure, a transistor is connected in common emitter configuration . If $V_{BE} = 1V$ and current gain $\beta = 100$, then the voltage across collector- emitter terminals V_{CE} is

[V_{BE}-voltage across base-emitter junction]



A. A. 2V

B. B. 4V

C. C. 5V

D. D. 3V

Answer: B

Watch Video Solution

20. A transistor is used in Common-emitter mode in an amplifier circuits. When a signal of 20 mV is added to the base-emitter voltage,

the base current changes by $40\mu A$ and the collector current changes by 2mA. The load resistance is $5k\Omega$ then the voltage gain is

A. 500

B. 200

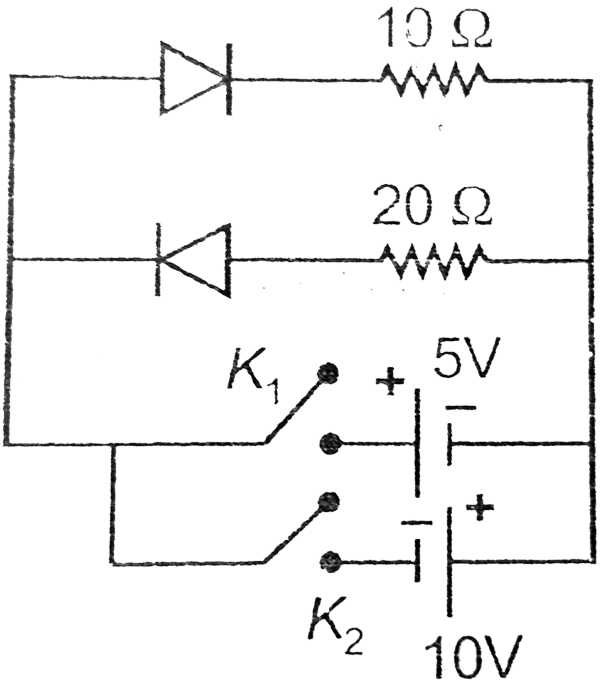
C. 400

D. 1000

Answer: A

Watch Video Solution

21. In the given circuit, calculate the ratio of currents through the battery if (1) Key K_1 is pressed, K_2 open and then (2) Key K_2 is pressed, key K_1 is opened



A. $\frac{1}{2}$

B. 4

C. 2

D. 1

Answer: D

 Watch Video Solution

22. In a transistor the current amplification α is '0.9', when connected in common base configuration. Now if the same transistor is connected in common emitter configurations

and the change in ouput current is 4.5 mA, then the corresponding charnge in the input current is

A. 2mA

B. 0.5 mA

C. 3mA

D. 0.25mA

Answer: B

Watch Video Solution

23. A transistor is connected in common base configuration, the collector supply is 8V and the voltage drop across a resistor of 800Ω in the collector circuit is 0.5V. If the current gain α is 0.96, then the base current is

A. $50 \times 10^{-6} A$

B. $450 \times 10^{-6} A$

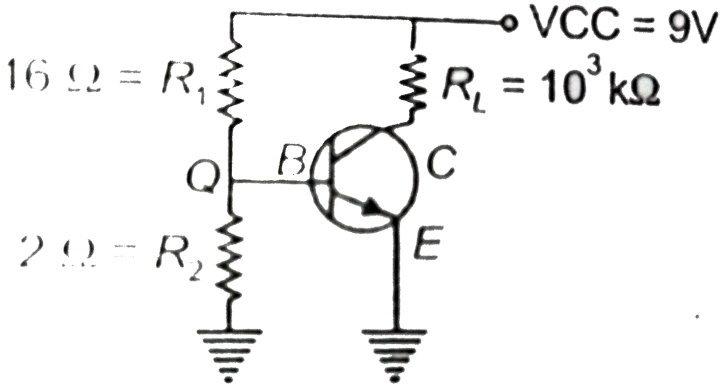
C. $80 \times 10^{-6} A$

D. $26 \times 10^{-6} A$

Answer: D

Watch Video Solution

24. In the given circuit , the voltage across the base emitter junction is



A. 2V

B. 1V

C. 3V

D. 4V

Answer: B

Watch Video Solution

25. If the current amplification factor for a transistor connected in common emitter configuration is 100 and input resistance is 200Ω, then the power gain is (Assume output resistance is $0.8k\Omega$)

A. 4×10^4

B. 5×10^3

C. 7×10^3

D. 45×10^4

Answer: A

Watch Video Solution

26. In doped semiconductor one dopent atom is kept typically for how many silicon atoms ?

A. 10^7

B. 10^4

C. 10^3

D. 10^9

Answer: A

Watch Video Solution

27. In a p-n junction diode the value of drift current through depletion region

A. Decreases in forward biasing

B. Decreases in reverse biasing

C. Remains unchanged during forward or reverse biasing

D. Increases during reverse biasing

Answer: D

Watch Video Solution

28. In the Boolean algebra $\overline{A} . \overline{B}$ equals

A. A+B

B. $\overline{A+B}$

C. $A-B$

D. $\overline{A}.B$

Answer: B

Watch Video Solution

29. In the adder circuits of two inputs

A. AND gate is used for carry forward memory

B. XOR gate is used for display

C. Both (1) and (2)

D. none of these

Answer: C

Watch Video Solution

Assignment Section C Linked Comprehension Type Question

1. In p-n junction diode, near junction holes combine with electrons, and impurity ions form a barrier potential which opposes the recombination of electron-hole pairs. Value of barriers potential for Si is 0.7 volt and for Ge is 0.3 V. thus charge density at the junction becomes zero and an electric field is produced near junction. this region is called depletion layer. Thickness of depletion layer is of the order of 10^{-6} meter. in forward bias p terminal is connected with the positive terminal of cell and n is connected with

negative terminal of cell and n is connected with negative terminal of cell. as forward voltage is increased, current increases exponentially.

As forward voltage is increased barrier potential in p-n junction diode is

A. increased

B. Decreased

C. remain same

D. nothing can be said.

A. Increased

B. Decreased

C. Remains same

D. nothing can be said

Answer: B

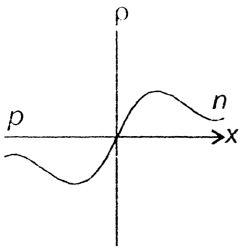
 Watch Video Solution

2. In p-n junction diode, near junction holes combine with electrons, and impurity ions form a barrier potential which opposes the recombination of electron-hole pairs. Value of

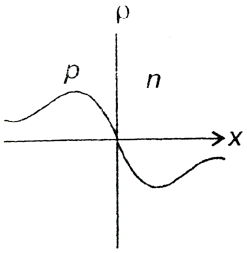
barriers potential for Si is 0.7 volt and for Ge is 0.3 V. thus charge density at the junction becomes zero and an electric field is produced near junction. this region is called depletion layer. Thickness of depletion layer is of the order of 10^{-6} meter. in forward bias p terminal is connected with the positive terminal of cell and n is connected with negative terminal of cell and n is connected with negative terminal of cell. as forward voltage is increased, current increases exponentially.

Correct graph for variation of charge density with distance from the junction is

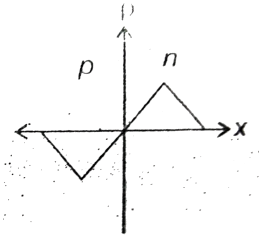
A.

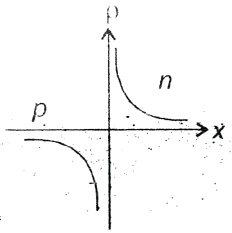


B.



C.



D. 

Answer: A

Watch Video Solution

3. In p-n junction diode, near junction holes combine with electrons, and impurity ions form a barrier potential which opposes the recombination of electron-hole pairs. Value of barriers potential for Si is 0.7 volt and for Ge is

0.3 V. thus charge density at the junction becomes zero and an electric field is produced near junction. this region is called depletion layer. Thickness of depletion layer is of the order of 10^{-6} meter. in forward bias p terminal is connected with the positive terminal of cell and n is connected with negative terminal of cell and n is connected with negative terminal of cell. as forward voltage is increased, current increases exponentially.

For Si diode minimum required forward voltage so that current can flow is

A. 0.3V

B. 1.4V

C. 0.7V

D. zero

Answer: C

Watch Video Solution

Assignment Section D Assertion And Reason

1. statement1:To make p type semiconductor , pentavalent impurity like phosphorus is mixed with Si.

statement2: Pentavalent impurity produces free electrons.

 Watch Video Solution

2. Statement1: In forward biasing current starts when minimum voltage of battery becomes equal to knee voltage

Statement2: Upto knee voltage barrier potential of diode prevents the motion of holes and electrons.

Watch Video Solution

3. Statement1: LED is used in display units because it emits light when current passes through it.

Statement2: In LED, electrons comes from conduction band to valence band when it emits energy.

Watch Video Solution

4. Assertion: In reverse biased condition a p-n junction diode does not conduct.

Reason: In reverse biased condition a diode has zero resistance.

Watch Video Solution

5. Assertion: A transistor can be used as an amplifier.

Reason: A small change in input current can change output on a large scale.

Watch Video Solution