PHYSICS

AAKASH INSTITUTE ENGLISH

SEMICONDUCTOR ELECTRONICS (MATERIAL, DEVICES AND SIMPLE CIRUITS)

Example

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

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2. In an intrinsic (pure) semiconductor, the number of conduction electrons is 8×10^{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.

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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 2×10^{22} per m^3. Calculate n_e in the doped silicon.

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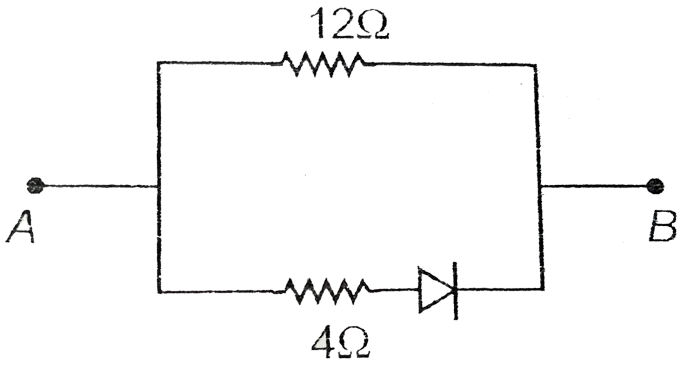
4. Find the equivalent resistance of the network shown in the figure between the points A and B if

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



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5. The diode used in the circuit shown in the figure has a constant voltage drop of 1V at all current and a maximum power rating of $100mW$. What should be the value of the resistor R, connected in series with the diode

for obtaining maximum current put less l?

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6. With an ac input from 50 Hz power line, the ripple frequency is

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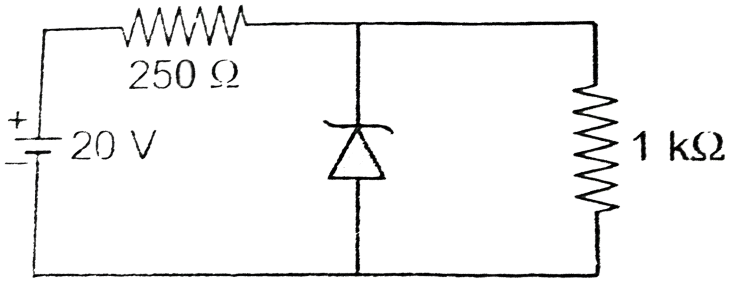
7. A zener diode having breakdown voltage equal to 15V, is used in a voltage regulator

circuit shown in figure. Find the current through the diode.



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8. A $p-n$ photodiode is made of a material with a band gap of $3.0eV$. The minimum frequency of the radiation that can be absorbed by the material is nearly

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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 ?

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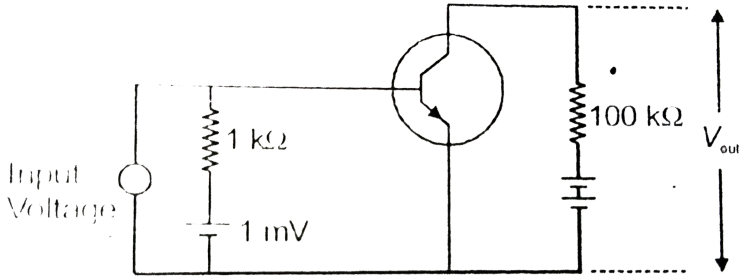
10. In the following common emitter configuration an n-p-n transistor with current

gain $\beta = 100$ is used. What is the output voltage of the amplifier ?



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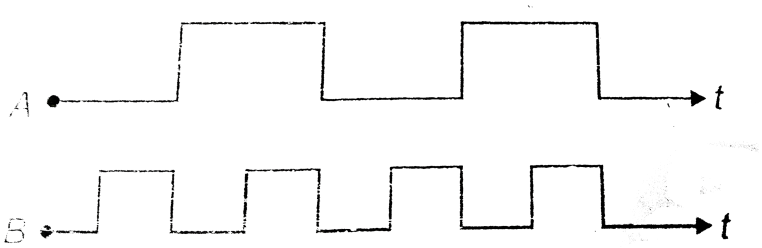
11. Show the output waveform of OR gate for the following input waveforms of A and B



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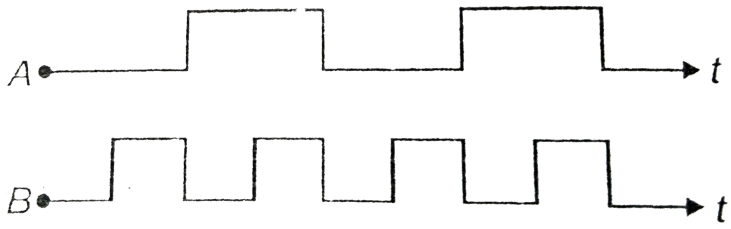
12. show the output waveform of AND gate for the following input waveforms of A and B.



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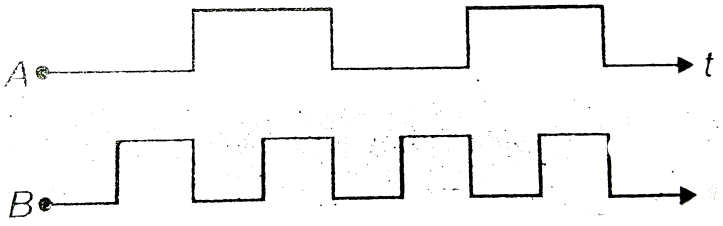
13. Sketch the output waveform Y from a NAND gate having following inputs A and B



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Try Your Self

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: 1

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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. $(E_g)_C$ gt $(E_g)_{Si}$,

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

C. $(E_g)_C$ lt $(E_g)_{Ge}$,

D. $(E_g)_C$ lt $(E_g)_{Si}$,

Answer: 1

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3. In a pure semiconductor, the number of conduction electron is 6×10^{19} per cubic meter. How many holes are there in a sample of size 1 cm x 2 cm x 2mm ?

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

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5. A semiconductor is known to have an electron concentration of 6×10^{12} per cubic centimeter and a hole concentration of 9×10^{13} per cubic centimeter. Is this semiconductor N-type or P-type ?

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6. Suppose a pure Si-crystal has $6 \times 10^{28} \text{atoms} m^{-3}$. It is doped by 1 ppm

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

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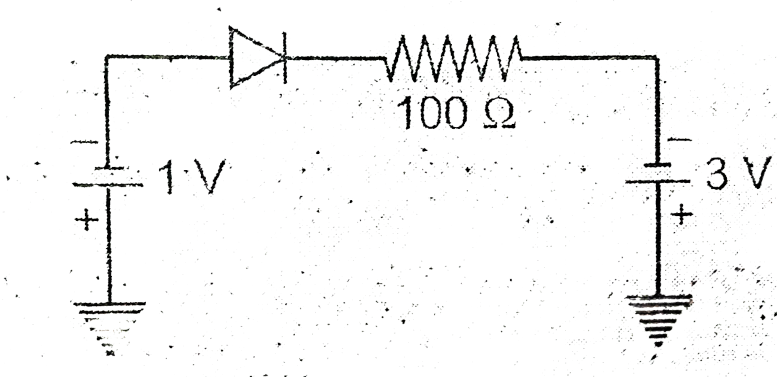
7. What is the current through an ideal p-n junction diode shown in figure below ?



A. Zero

B. $10mA$

C. $20mA$

D. $50mA$

Answer: C

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8. If in p-n junction diode a sinusoidal input signal is applied as shown Then the output signal across R_L will bw

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9. In a reverse biased diode, when the applied voltage changes by $1V$, the current is found to change by $0.5\mu A$. The reversebiase resistance of the diode is

A. $2 \times 10^5 \Omega$

B. $2 \times 10^6 \Omega$

C. 200Ω

D. 2Ω

Answer: B

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10. Potential drop across forward junction p-n diode is 0.7 V. If a battery of 4 V is applied, calculate the resistance to be put in series, if the maximum current in the circuit is $5mA$.

Hint: $R = 4 - \frac{07}{5} \times 10^{-3} = 660\Omega$

A. 660Ω

B. 350Ω

C. 475Ω

D. 500Ω

Answer: A

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

A. Majority carrier in both regions

B. Minority carrier in both regions

C. Free electrons in the n-region

D. Holes in the p - region

Answer: A

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12. A forward biased diode is

A. 

B. 

C. 

D. 

Answer: D

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13. Application of forward bias to p-n junction

A. Increases the number of donors on the N-side

B. Increases the electric field in the depletion zone.

C. Increases the potential difference acros the depletion zone

D. Widens the depletion zone

Answer: A

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14. In a p-n junction having depletion layer of thickness 10^{-6} m the potential across it is $0.3V$. Then the electric field is

Hint = $E = \frac{V}{d}$

A. $10^{-5}\frac{V}{m}$

B. $3 \times 10^{5}\frac{V}{m}$

C. $10^{-6}\frac{V}{m}$

D. $3 \times 10^{7}\frac{V}{m}$

Answer: B

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15. Pickout the incorrect statement regarding reverse saturation current in the $p-n$ junction diode.

A. Reverse saturation current is also known as leakage current

B. Current doubles of every $100^{\circ}C$ rise in temperature

C. Current carriers are produced by thermal agitation

D. Current is due to minority carriers

Answer: B

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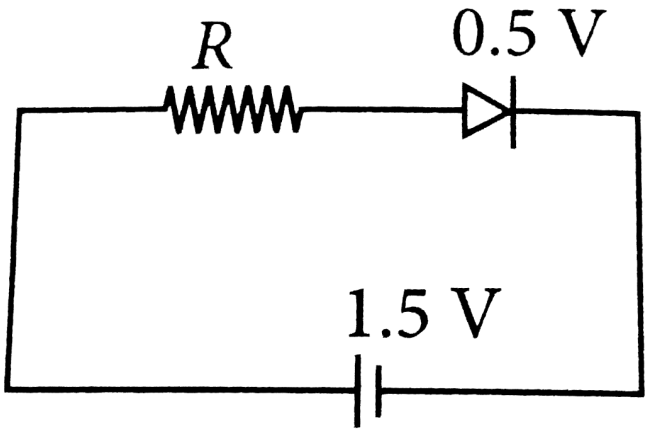
16. The diode used in the circuit shown in the figure has a constant voltage drop at 0.5 V at all currents and a maximum power rating of 100 mW. What should be the value of the resistor R, connected in series with diode, for obtaining maximum current ?



A. 200Ω

B. 6.67Ω

C. 5Ω

D. 1.5Ω

Answer: C

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17. With an ac input from 50 Hz power line, the ripple frequency is

A. 50 Hz

B. 100 Hz

C. 70 Hz

D. 25 Hz

Answer: B

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18. 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 ?

A. 50

B. 100

C. 25

D. 150

Answer: A

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

A. An AC voltage

B. A DC voltage

C. Zero

D. A pulsating unidirectional voltage

Answer: D

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20. 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?

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21. 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 ?

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

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23. 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. what should be 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. Also calculate the dc drop across the collector resistance. (Refer to figure of CE amplifier) . Take $V_{BE} = 0.6V$

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24. In the figure of transistor as a switch, the V_{BB} supply can be varied from 0V to 5V. The Si transistor has $\beta_{dc} = 250$ and $R_B = 100k\Omega, R_C = 1k\Omega, V_{CC} = 5V$. Assume that when the transistor is saturated,

$V_{CE} = 0V$ and $V_{BE} = 0.8V$. calculate

(a) the minimum base current for which the transistor will reach saturation. hence.

(b) Determine V_i when the transistor is switched on

(C) Find the ranges of V_i for which the transistor is switched off and switched on'

A. The minimum base current for which the transistor will reach saturation, Hence

B. Determine V_1 when the transistor is switched on

C. Find the ranges of V_1 for which the transistor is switched off and switched on

D.

Answer:

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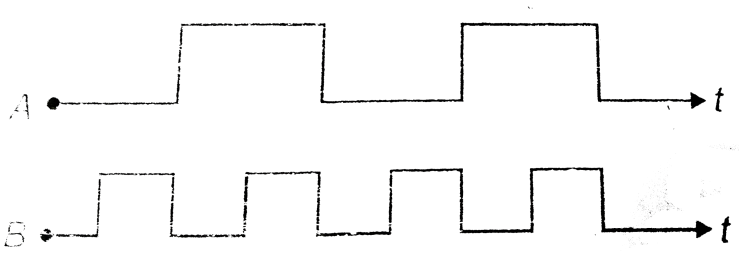
25. Show the output waveform of OR gate for the following input waveforms of A and B



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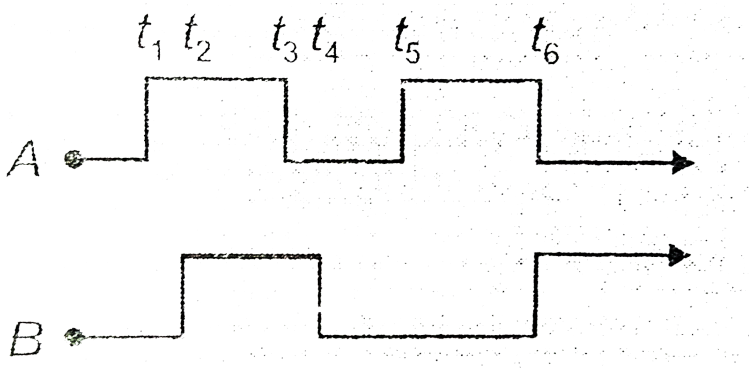
26. Sketch the output waveform obtained from AND gate for the following inputs A and B.



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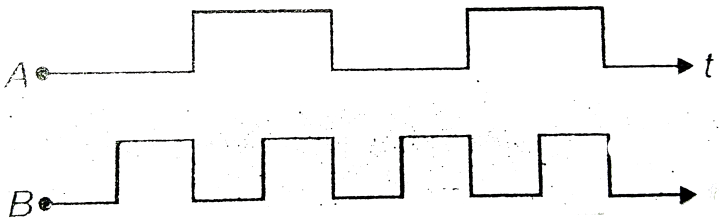
27. Sketch the output waveform Y from a NAND gate having following inputs A and B



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Exercise

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

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2. The mobility of free electron is greater than that of free holes because

A. Carry negativ charge

B. Are light

C. Mutually collide less

D. Require low energy to continue their motion

Answer: D

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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 neglibly small in all the three

B. The number of free 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

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4. Which circuit will not show current in ammeter ?

A. 

B. 

C. 

D. 

Answer: A

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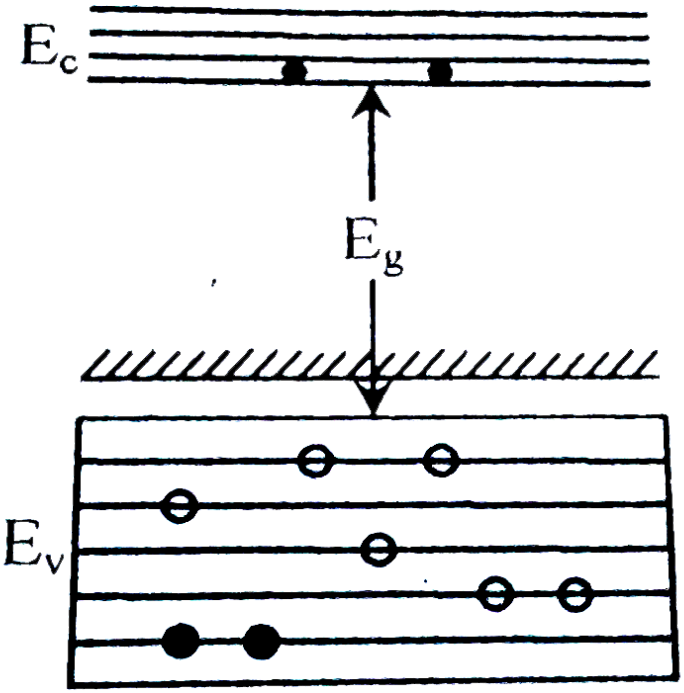
5. In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is:-



A. A p-type semiconductor

B. An n-type semiconductor

C. An insulator

D. A metal

Answer: A

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6. A p-n photodiode is made of a material with a band gap of 1 e V. The minimum frequency of the radiation that can be absorbed by the material is nearly

(hc= 1240 eV nm)

A. $1 \times 10^{14} Hz$

B. $2.4 \times 10^{14} Hz$

C. $1.5 \times 10^{14} Hz$

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

Answer: B

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

200Ω is

A. $0.001A$

B. $0.1A$

C. $0.01A$

D. Zero

Answer: D

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8. A silicon specimen is made into a p-type semiconductor by doping. On an average, one indium atom per 5×10^7 silicon atoms. If the number density of atoms in the silicon specimen is $5 \times 10^{28} atm/m^3$, 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

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9. A full wave rectifier circuit along with the input and output are shown in the figure. The contribution from the diode D_2 is (are)

A. C

B. A, C

C. B,D

D. A,B,C,D

Answer: C

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10. In a $p-n$ junction diode having depletion layer of thickness $10^{-6}m$, the potential across it is $1V$. 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: C

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11. 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

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12. a common emitter amplifier gives an output of 3V for an input of 0.01 V. if current gain of the transistor is 100 and the input

resistance is $10k\Omega$. Then the collector resistance is

A. $30k\Omega$

B. $3k\Omega$

C. $1k\Omega$

D. $6k\Omega$

Answer: A

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13. 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

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14. 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

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15. Which of the following represents NAND gate ?

A. 

B. 

C. 

D. 

Answer: A

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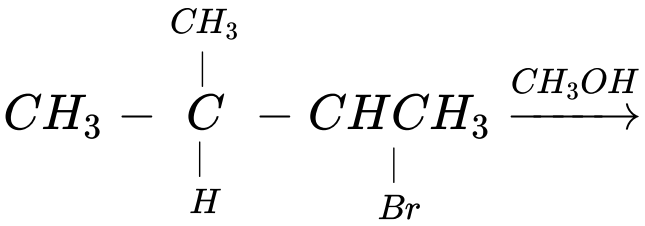
16. The major product of the following reaction is:



A. NOR gate

B. OR gate

C. AND gate

D. NAND gate

Answer: B

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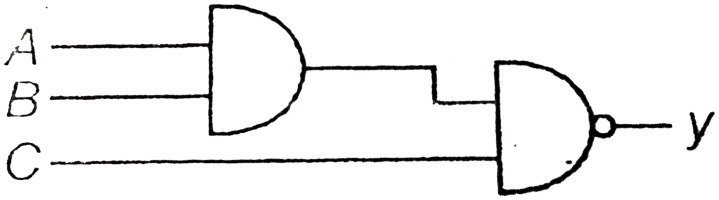
17. 

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

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18. To which logic gate does the truth table given in the figure correspond?

A. OR gate

B. AND gate

C. NAND gate

D. NOR gate

Answer: C

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19. 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

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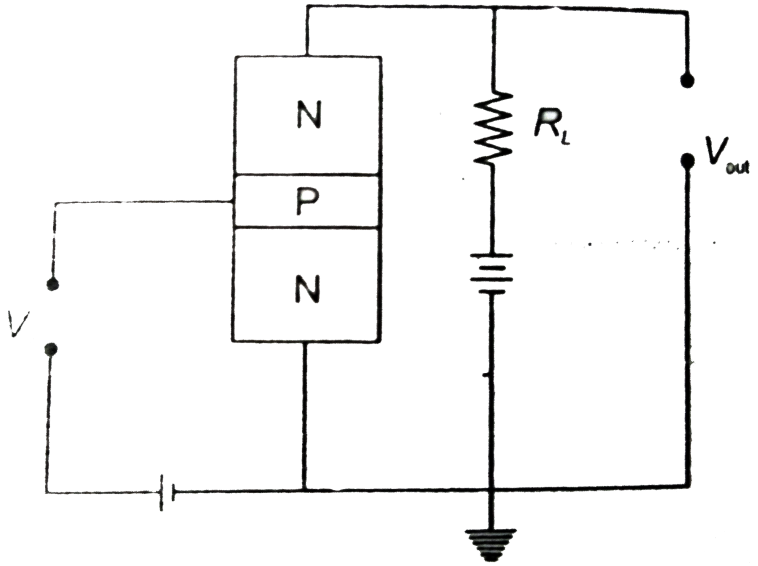
20. An n-p-n transistor circuit is arranged as shown in the figure. It is a common



A. Base amplifier circuit

B. Emitter amplifier circuit

C. Collector amplifier circuit

D. None of these

Answer: B

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Assignment Section A Objective Type Question

1. The semiconductor are generally

A. Monovalent

B. Divalent

C. Trivalent

D. Tetravalent

Answer: D

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2. The conductivity of a semiconductor depends upon

A. Size of the atom

B. The nature of atom

C. Types of bonds

D. Size and types of motion

Answer: B

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3. The impurity atoms with which pure silicon should be doped to make a p- type semiconductor are those of

A. Phosphorus

B. Antimony

C. Boron

D. Copper

Answer: C

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4. In semiconductors, which one of the following relations is correct at thermal equilibrium?

A. $n_i = n_e = n_h$

B. $n_i^2 = n_e n_h$

C. $n_i = \frac{n_e}{n_h}$

D. $n_i = n_e + n_h$

Answer: B

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5. In a semiconductor,

A. An infinite resistance at 0° C

B. A finite resistance which does not depend upon temperature

C. A finite resistance which increases with temperature

D. A finite resistance which decreases with temperature

Answer: D

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6. The rate of recombination or generation are governed by the law(s) of

A. Mass conservation

B. Electrical neutrality

C. Thermodynamics

D. Chromodynamics

Answer: C

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7. An n-type semi- conductor is

A. Positive

B. Negative

C. May be positive or negative

D. Neutral

Answer: D

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8. Solids having highest energy level partially filled with electrons are

A. An insulator

B. A conductor

C. A semiconductor

D. None of these

Answer: B

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9. The energy gap for an insulator may be

A. $1.1eV$

B. $0.02eV$

C. $6eV$

D. $0.7eV$

Answer: C

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10. If N_A is number density of acceptor atoms added and N_D is number density of donor atoms added to a semiconductor, n_e and n_h are the number density of electrons and holes in it, then

A. $n_e = N_D, n_h = N_A$

B. $n_e = N_A, n_h = N_D$

C. $n_e = N_D = n_h + N_A$

D. $n_e + N_A = n_h + N_D$

Answer: D

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11. In an unbiased p-n junction which of the following is correct?

A. p-side is at higher potential than n-side

B. n-side is at higher potential than p-side

C. Both p-side and n-side are at the same potential

D. Any of the above is possible depending upon the carrier density in the two sides.

Answer: B

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12. With an ac input from 50 Hz power line, the ripple frequency is

A. $25Hz$

B. $50Hz$

C. $70.7Hz$

D. $100Hz$

Answer: D

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13. In a semiconductor diode, reserve bias current is due to drift of free electrons and holes caused by

A. Thermal excitations only

B. Impurity atoms only

C. Both (1) & (2)

D. Neither (1) nor (2)

Answer: A

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14. The value of form factor in case of half wave rectifier is

A. 1.11

B. 1.57

C. 1.27

D. 0.48

Answer: B

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15. In a semiconductor diode p-side is earthed and N-side is applied a potential of -2V, the diode shall

A. Conduct

B. Not conduct

C. Conduct partially

D. Break down

Answer: A

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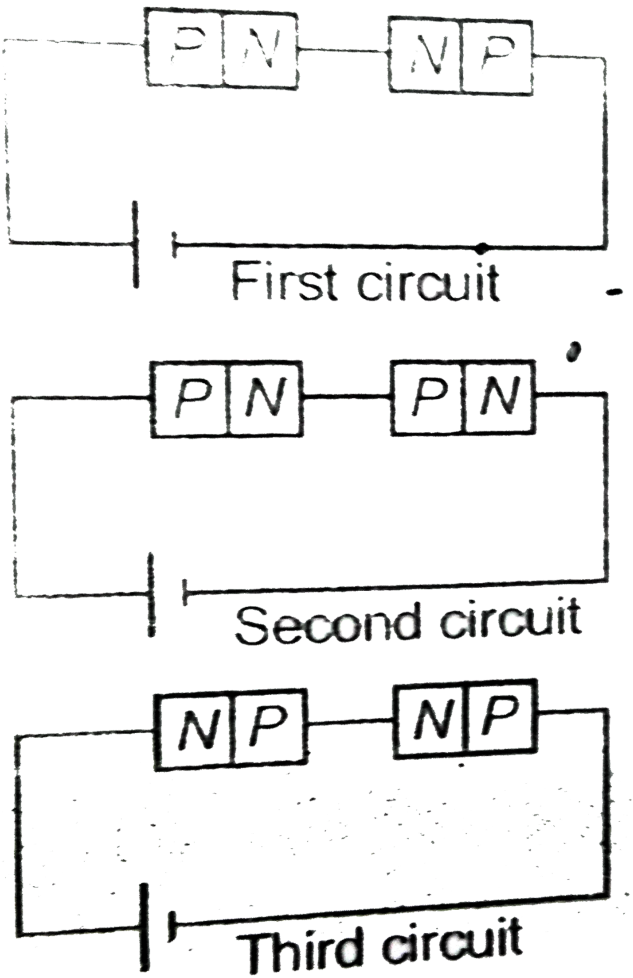
16. Two identical P-N junctions, may be connected in series with a battery in three ways as shown in the adjoining fiugre. The potential drop across the P-N junction are

equals in



A. First and second circuits

B. Second and third circuits

C. Third and first circuits

D. All of these

Answer: B

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17. Zener diode is used for:-

A. Rectification

B. Amplification

C. Stabilization

D. All of these

Answer: C

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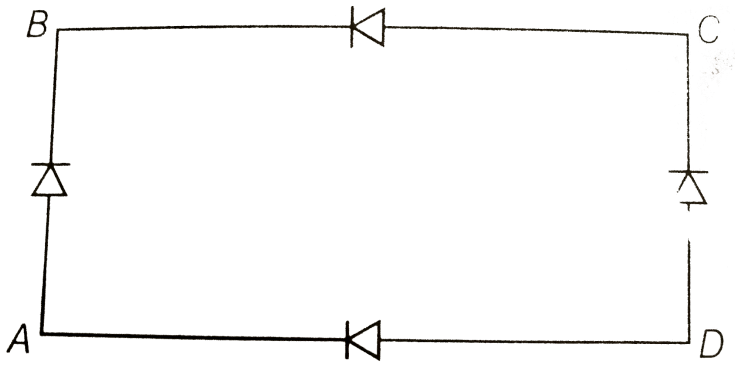
18. In figure the input is across the terminals A and C and the output is across B and D. Then the output is



A. Zero

B. Same as input

C. Full wave rectified

D. Half wave rectified

Answer: C

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19. A junction diode , in which one of the p or n - sections is made very thin, can be used to

convert light energy into electrical energy, then the diode is called

A. Light emitting diode

B. Zener diode

C. Solar cell

D. Photo diode

Answer: C

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20. The materials suitable for making a solar cell is

A. PbS

B. GaAs

C. CdSe

D. Ge

Answer: B

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21. 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

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

A. Zero

B. $\frac{\pi}{4}$

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

D. π

Answer: A

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23. The current transfer ratio β of a transistor is 100. The input resistance of the transistor when used in common emitter mode is 1 kilo ohm. The peak value of the collector alternating current for an input peak voltage of 0.01 volt is

A. $1mA$

B. $10mA$

C. $0.1mA$

D. $0.01mA$

Answer: A

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24. In a common emitter transistor circuit, the base current is $40\mu A$, then V_{BE} is

A. $2V$

B. $0.2V$

C. $0.8V$

D. Zero

Answer: B

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25. 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 is mainly because of electrons

B. The flow across the base region is mainly because of holes

C. Recombination is decreased in the base region

D. Base current is high

Answer: C

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26. A transsitor is operated in CE configuration at $V_{\mathbb{C}} = 2V$ such that a change in base current from 100 μA to 200 μA produces a

change in the collector current from 9mA to 16.5 mA. The value of current gain, β is -

A. 45

B. 50

C. 60

D. 75

Answer: D

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27. The input resistance of a silicon transistor is 665Ω. Its base current is changed by $15\mu A$ which results in the change in collector current by $2mA$. This transistor is used as a common emitter amplifier with a load resistance of $5k\Omega$. What is the voltage gain of the amplifier.

A. 100

B. 1000

C. 500

D. 2000

Answer: B

Watch Video Solution

28. The relationship between α and β is given by

A. $\alpha = \beta$

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

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

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

Answer: C

Watch Video Solution

29. In a common base transistor circuit, the current gain is 0.98. On changing the emitter current by 1 mA, the change in collector current is

A. $0.196mA$

B. $2.45mA$

C. $4.9mA$

D. $0.98mA$

Answer: D

Watch Video Solution

30. For a transistor amplifier power gain and voltage gain are $7.5 \text{ and } 2.5$ respectively. The value of the current gain will be

A. 0.33

B. 0.66

C. 0.99

D. 3

Answer: D

 Watch Video Solution

31. The input resistance of a common-emitter amplifier is $2k\Omega$ and a.c. Current gain is 20. If

the load resistance used is $5k\Omega$, calculate the transconductance of the transistor used

A. $0.01\Omega^{-1}$

B. $0.03\Omega^{-1}$

C. $0.04\Omega^{-1}$

D. $0.07\Omega^{-1}$

Answer: A

Watch Video Solution

32. In a silicon transistor, a change of $7.89mA$ in the emitter current produce a change of 7.6 mA in the collector current. What change in the base current is necessary to produce an equivalent change in the collector current?

A. $29mA$

B. $0.29mA$

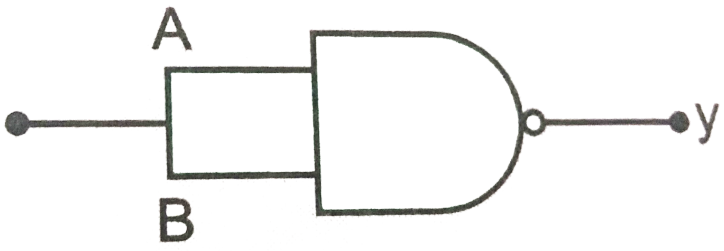
C. $0.029mA$

D. Zero

Answer: B

Watch Video Solution

33. The abjoining logic symbol is equivalent to



A. OR gate

B. AND gate

C. NOT gate

D. NAND gate

Answer: B

Watch Video Solution

34. Which of the following gates corresponds to the truth table given below?

A. NAND

B. NOR

C. XOR

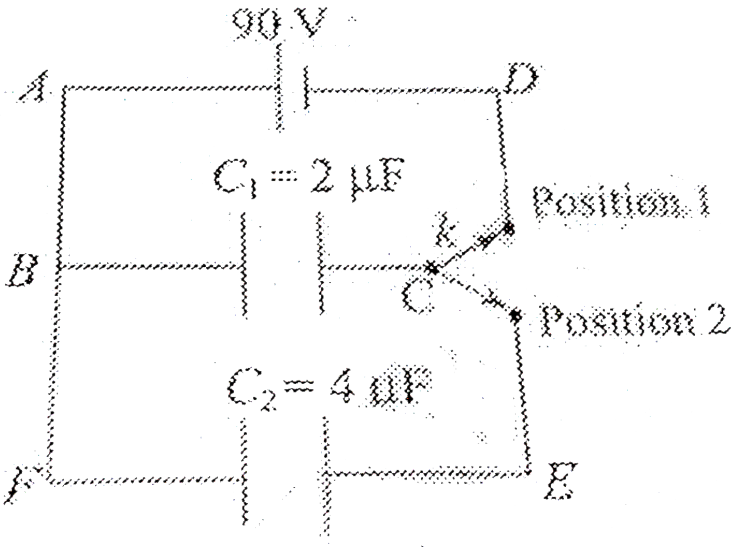
D. OR

Answer: A

Watch Video Solution

35. Figure shows two capacitors of capacitance $2\mu F$ and $4\mu F$ and a cell of 90 V. The switch 'k' is such that when it is in position 1, the circuit ABCD is closed and when it is in position 2, the circuit BCEF is closed.the resistance of both the circuits is negligible os that the capacitor gets fully charged instantly. Initially the switch is in position1. then it is turned in position 2

and then in position 1. Now two cycles are completed. Find the charge $(\text{in}\mu C)$ after two cycles.



A. NAND

B. NOR

C. XOR

D. XNOR

Answer: A

Watch Video Solution

36. The combination of gates shown in the circuit is equivalent to

A. OR

B. AND

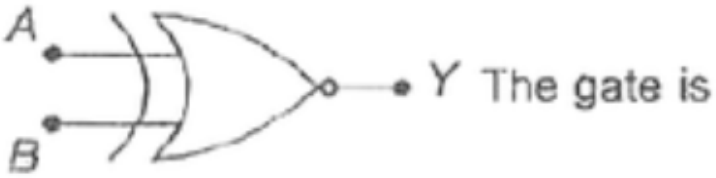
C. NAND

D. NOR

Answer: A

Watch Video Solution

37. Find Y



The gate is

A. OR gate

B. AND gate

C. XNOR gate

D. NOR gate

Answer: C

Watch Video Solution

38. Write down the boolean experssion for output Y of a system shown in figure

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

B. $(\overline{A} + \overline{B})$(A + B)

C. $\overline{A}\,\overline{B}$ + AB

D. $AB + (\overline{A} + \overline{B})$

Answer: C

Watch Video Solution

39. Copper has face-centered cubic (fcc) lattice with interatomic spacing equal to 2.54Å. The value of lattice constant for this lattice is

A. $0.35A$

B. $3.5A$

C. $7.0A$

D. $1.5A$

Answer: B

 Watch Video Solution

40. If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be.

A. $a\frac{\sqrt{3}}{2}$

B. $a\sqrt{3}$

C. $a\frac{\sqrt{3}}{4}$

D. $a\sqrt{2}$

Answer: A

Watch Video Solution

41. Liquid crystal display monitors are made of

A. Monocrystals

B. Single crystals

C. Liquid crystals

D. Polycrystals

Answer: C

Watch Video Solution

42. Which of the following cannot be obtained from an IC?

A. Resistor

B. Diode

C. Inductor

D. Capacitor

Answer: C

Watch Video Solution

43. Operational amplifier is a

A. Digital IC

B. Linear IC

C. OR gate

D. AND gate

Answer: B

Watch Video Solution

Assignment Section B Objective Type Question

1. In a zener diode, break down occurs in reverse bias due to

A. thin depletion region

B. Internal field emission

C. High doping concentration

D. All of these

Answer: B

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2. A $p-n-p$ transistor is said to be in active region of operation, When

A. both emitter junction and collector junction are forward biased

B. both emitter junction and collector junction are reverse biased

C. emitter junction is forward biased and collector junction is reverse biased

D. emitter junction is reverse biased and collector junction is forward biased

Answer: C

Watch Video Solution

3. In the figure given, voltage of point A is

A. $0V$

B. $-3V$

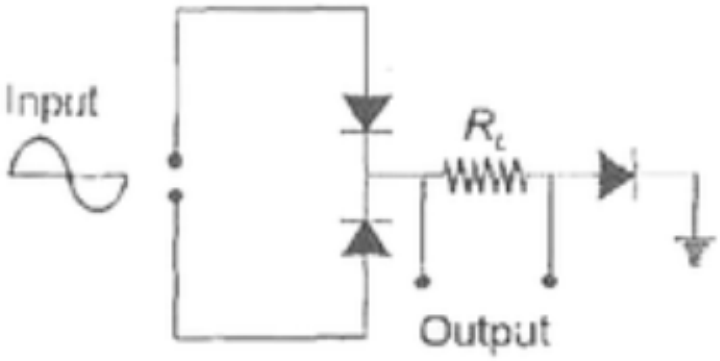
C. $-2.3V$

D. $-2.7V$

Answer:

Watch Video Solution

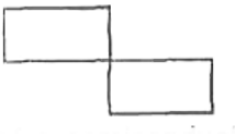
4. In the circuit shown , the input waveform is given. Which of the following correctly gives the output wavefrom across R_L?



A. 

B. 

C. 

D. 

Answer: B

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5. 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

6. In a transistor the collector current is always less than the emitter current because

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

B. Collector being reverse biased, attracts less 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

7. 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

8. Four equal resistors, each of resistance 10Ω, are connected as shown in the circuit diagram. The equivalent resistance between A and B is

A. 5Ω

B. 10Ω

C. 20 Omega`

D. 40Ω

Answer: B

Watch Video Solution

9. A transistor cannot be used as an

A. Amplifier

B. Oscillator

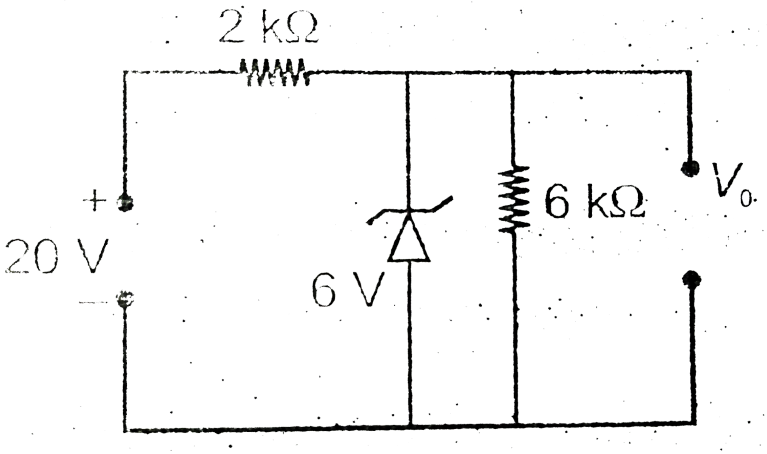
C. Modulator

D. Rectifier

Answer: D

 Watch Video Solution

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



A. $6V$

B. $14V$

C. $20V$

D. $26V$

Answer: A

Watch Video Solution

11. What is the power gain in a CE amplifier, where input resistance is $3k\Omega$ and load resistance 24 $k\Omega$ given $\beta = 6$?

A. 180

B. 288

C. 240

D. 480

Answer: B

Watch Video Solution

12. For inputs (A, B) and output(Y) of the following gate can be expressed as

A. $A \oplus B$

B. $A.B$

C. $A + B$

D. $\overline{A} + \overline{B}$

Answer: A

Watch Video Solution

13. Calculate the current I in the following circuit, if all the diodes are ideal. All resistances are 200Ω

A. Zero

B. $1A$

C. $2A$

D. $4A$

Answer: B

Watch Video Solution

14. A transistor having $\alpha = 0.99$ is used in a common base amplifier. If the load resistance is $4.5k\Omega$ and the dynamic resistance of the emitter junction is 50Ω the voltage gain of the amplifier will be

A. 79.1

B. 8910

C. 78.2

D. 450

Answer: B

 Watch Video Solution

15. A potential difference of $2.5V$ is applied across the faces of a germanium crystal plate. The face area of the crystal is $1cm^2$ and its thickness is $1.0mm$. The free electron concentration in germanium is $2 \times 10^{19} m^{-3}$

and the electron and holes mobilities are $0.33\frac{m^2}{V}s$ and $0.17\frac{m^2}{V}$ s respectively. The current across the plate will be

A. $0.2A$

B. $0.4A$

C. $0.6A$

D. $0.8A$

Answer: B

Watch Video Solution

16. In the following transistor amplifier circuit

$\beta = 50$. $Vce \rightarrow$ of the transistor is

A. 4 V

B. 6 V

C. 10 V

D. 8 V

Answer: B

Watch Video Solution

17. Assertio Wavelength of charachteristic X-rays is given by

$$\frac{1}{\lambda} \propto \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$$

in trasnition from $n_2 \rightarrow n_1$. In the abvoe relation proportionality constant is series dependent. For different series (K-series, L-series, etc.) value of this constant will be different.

Reason For L-series value of this constant is less than the value for K-series

A. Common base connection

B. Common emitter connection

C. Common collector connection

D. All of these

Answer: B

Watch Video Solution

18. The circuit shown in the figure contains two diodes each with a forward resistance of 50Ω and with infinite backward resistance. If the batter of 6 V is connected in the circuit,

then the current through the 100Ω resistance is

A. Zero

B. $0.02A$

C. $0.03A$

D. $0.036A$

Answer: B

Watch Video Solution

19. Three amplifiers each having voltage gain 10, are connected in series. The resultant gain would be

A. 10

B. 30

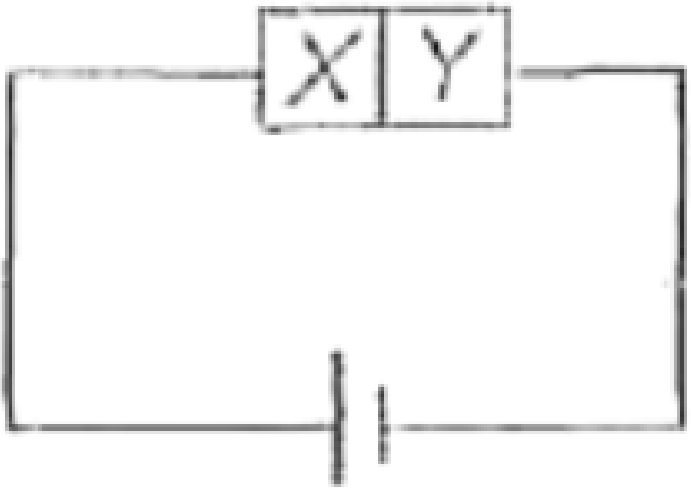
C. 1000

D. $\frac{10}{3}$

Answer: C

Watch Video Solution

20. A semiconductor X is made by doping a germanium crystal with aresenic (Z = 33). A second semiconductor Y is made by doping germanium with indium (Z= 49). X and Y are used to form a junction as shown in figure and connected to a battery as shown. Which of following statement is correct?



A. X is p -type, Y is n-type and the junction is forward biased.

B. X is n-type, Y is p - type and the junction is forward biased

C. X is p-type, Y is n - type and the junction is reversed biased

D. X is n-type, Y is p - type and the junction is reverse biased

Answer: D

 Watch Video Solution

21. The maximum effeciency of full wave rectifier is

A. $\frac{4}{\pi^2} \times 100\,\%$

B. $\frac{8}{\pi^2} \times 100\,\%$

C. $40\,\%$

D. $80\,\%$

Answer: B

Watch Video Solution

22. Logic gate realised from pn Junctions shown in figure is

A. OR gate

B. AND gate

C. NOT gate

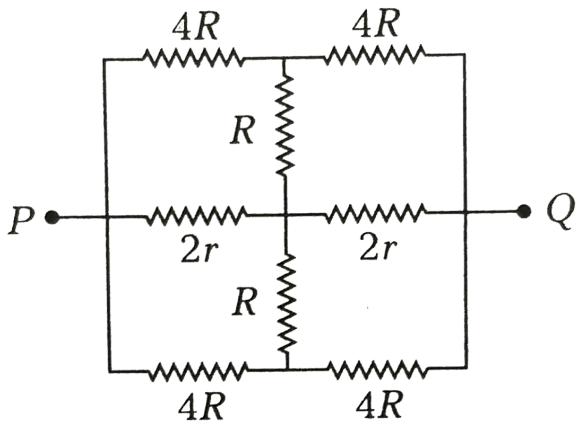
D. NOR gate

Answer: A

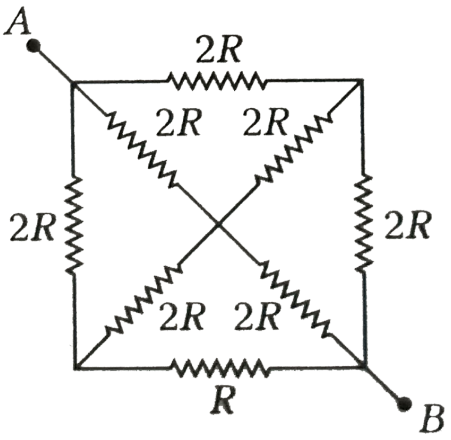
Watch Video Solution

23. Find the equivalent resistance between P and Q.

(i)



(ii)



A. Half wave rectified

B. Full wave rectified

C. Quarter rectified

D. ac

Answer: B

Watch Video Solution

24. Which of the following pn junction is not used in reverse bias?

A. LED

B. Solar cell

C. Zener diode

D. Both (1) & (2)

Answer: D

Watch Video Solution

25. Which of the following break down of pn junction is reverisble?

A. Avalanche breakdown

B. Zener breakdown

C. Dielectric breakdown

D. All of these

Answer: B

Watch Video Solution

26. In the circuit shown, the average power dissipated in the resistor is (assume diode to be ideal)

A. $\frac{E_0^2}{2}R$

B. $\frac{E_0^2}{4}R$

C. $\frac{E_0^2}{R}$

D. Zero

Answer: B

Watch Video Solution

27. A crystal has bcc structure and its lattice constant is $3.6A$. What is the atomic radius?

A. $3.6A$

B. $1.8A$

C. $1.27A$

D. $1.56A$

Answer: D

Watch Video Solution

28. All the diodes are ideal. The current flowing in 2Ω resistor connected between the diodes D_1 and D_2 is

A. $1A$

B. $2A$

C. $3A$

D. Zero

Answer: A

Watch Video Solution

29. In a transitor $(B\eta = 50)$, the voltage across $5k\Omega$ load resistance in collector circuit is $5V$. The base current is

A. $0.02mA$

B. $0.03mA$

C. $0.08mA$

D. $0.09mA$

Answer: A

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Assignment Section C Previous Years Type Question

1. Which of the following represents forward biase diode?

A. 

B. 

C. 

D. 

Answer: B

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2. The given electrical network is equivalent to

A. AND gate

B. OR gate

C. NOR gate

D. NOT gate

Answer: C

Watch Video Solution

3. In a common emitter transistor amplifier the audio signal voltage across the collector is $3V$. The resistance of collector is $3k\Omega$. If current gain is 100 and the base resistance is $2k\Omega$, the voltage and power gain of the amlifier is :

A. $200 \text{ and } 1000$

B. $15 \text{ and } 200$

C. $150 \text{ and } 15000$

D. $20 \text{ and } 2000$

Answer: C

Watch Video Solution

4. For CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 4V. If the current amplification factor of the transistor is 100 and the base resistance is $1k\Omega$, then the input signal voltage is

A. $10mV$

B. $20mV$

C. $30mV$

D. $15mV$

Answer: B

Watch Video Solution

5. The given circuit has two ideal diodes connected as shown in the figure below. The current flowing through the resistance R_1 will be

A. $2.5A$

B. $10.0A$

C. $1.43A$

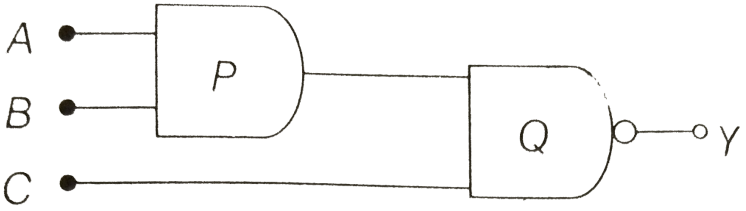
D. $3.13A$

Answer: A

Watch Video Solution

6. What is the output Y in the following circuit, when all the three inputs A, B, C are first 0 and

then 1?



A. 0, 1

B. 0, 0

C. 1, 0

D. 1, 1

Answer: C

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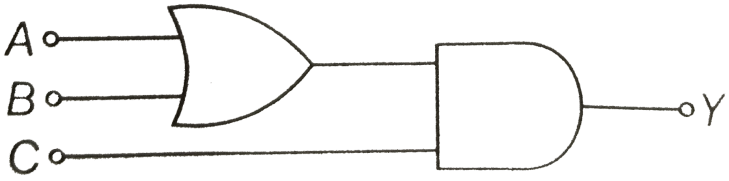
7. To get output 1 for the following circuit, the correct choice for the input is



A. $A = 1, B = 0, C = 1$

B. $A = 0, B = 1, C = 0$

C. $A = 1, B = 0, C = 0$

D. $A = 1, B = 1, C = 0$

Answer: A

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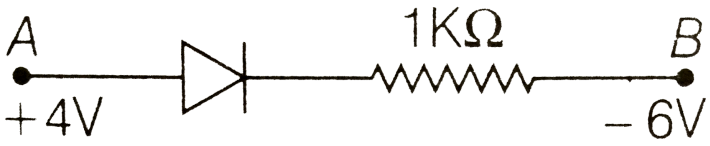
8. Consider the junction diode as ideal. The value of current flowing through AB is



A. $10^{-3}A$

B. $0A$

C. $10^{-2}A$

D. $10^{-1}A$

Answer: C

Watch Video Solution

9. A n-p-n transisitor is connected in common emitter configuration in a given amplifier. A load resistance of 800Ω is connected in the collector circuit and the voltage drop across it is $0.8V$. If the current amplification factor is 0.96 and the input resistance of the circuits is 192Ω, the voltage gain and the power gain of the amplifier will respectively be

A. $4, 3.69$

B. $4, 3.84$

C. $3.69, 3.84$

D. $4, 4$

Answer: B

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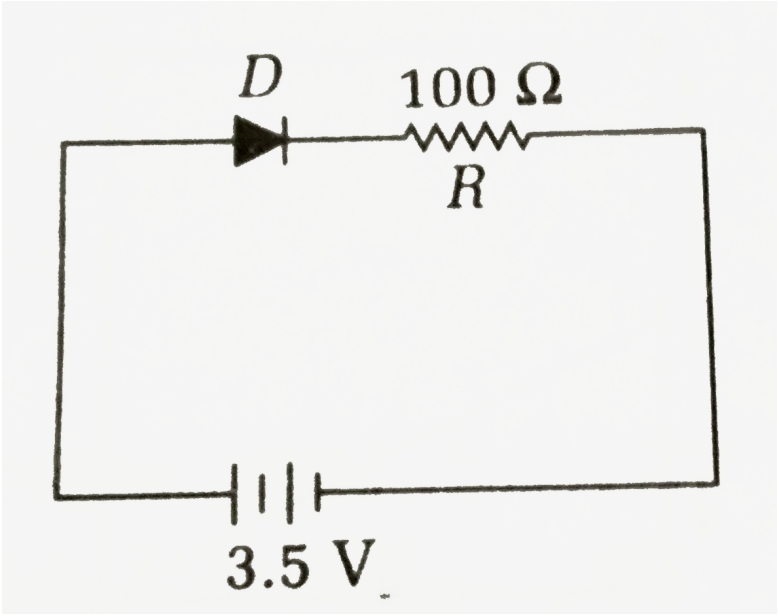
10. In the given figure, a dipole D is connected to an external resistance $R = 100\Omega$ and an e.m.f. of $3.5V$. If the barrier potential

developed across the dipole is $0.5V$, the current in the circuit will be



A. $35Ma$

B. $30mA$

C. $40mA$

D. $20mA$

Answer: B

Watch Video Solution

11. The input signal given to a CE amplifier having a voltage gain of 150 is $V_i = 2\cos\left(15t + \frac{\pi}{2}\right)$. The corresponding output signal will be

A. $300\cos\left(15t + 4\frac{\pi}{3}\right)$

B. $300co\left(15t + \frac{\pi}{3}\right)$

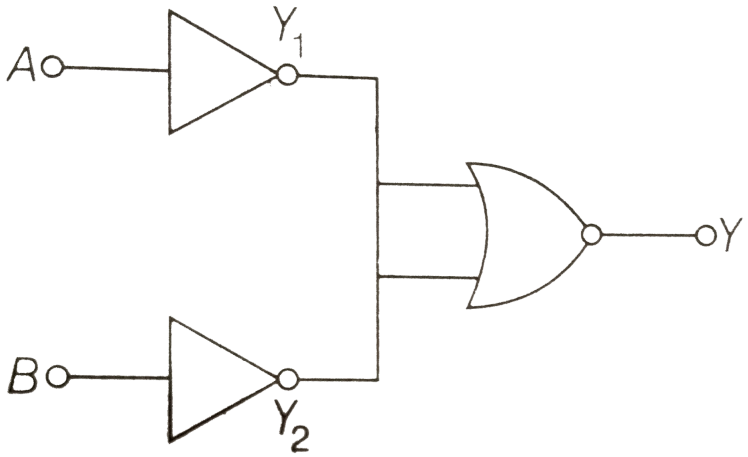
C. $75\cos\left(15t + 2\frac{\pi}{3}\right)$

D. $2\cos\left(15t + 5\frac{\pi}{6}\right)$

Answer: A

Watch Video Solution

12. Which logic gate is represented by the following combination of logic gates?



A. NOR

B. OR

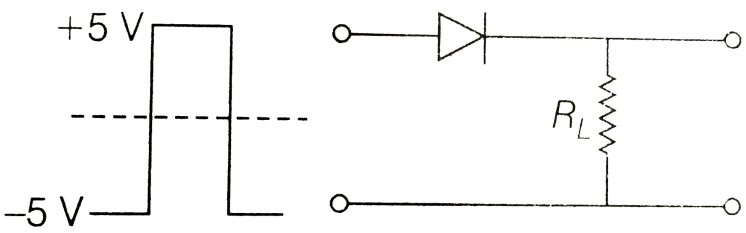
C. NAND

D. AND

Answer: D

Watch Video Solution

13. If in a p-n junction, a square input signal of $10V$ is applied as shown,



then the output across R_L will be

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

14. Given

$$\frac{\underbrace{1000.....01}_{n\,\text{zeroes}}}{\underbrace{1000.....01}_{(n+1)\,\text{zeroes}}} < \frac{\underbrace{1000.....01}_{m\,\text{zeroes}}}{\underbrace{1000.....01}_{(m+1)\,\text{zeroes}}}$$

then which of the following true

A. It is $V - I$ characteristics for solar cell

where, point A represents open circuit

voltage and point B short circuit current.

B. It is for a solar cell and points A and B represent open circuit voltage and current, respectively

C. It is for photodiode and points A and B represent open circuit voltage and current, respectively.

D. It is for a LED and points A and B represent open circuit voltage and short circuit current respectively.

Answer: A

Watch Video Solution

15. The barrier potential of a p-n junction depends on

(i) type of semiconductor material

(ii) amount of doping

(iii) temperature

Which one of the following is correct ?

A. (a) and (b) only

B. (b) only

C. (b) and (c) only

D. (a), (b) and (c)

Answer: D

Watch Video Solution

16. In a n-type semiconductor, which of the following statement is true ?

A. Electrons are minority carriers and pentavalent atoms are dopants

B. Holes and minority carries and pentavalent atoms are dopants

C. Holes are majority carriers and trivalent atoms are dopants

D. Electrons are majority carriers and trivalent atoms are dopants.

Answer: B

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17. In a common emitter (CE) amplifier having a voltage gain G, the transistor used has transconductor 0.03 mho and current gain 25. If the above transistor is replaced with another one with transconductance 0.02 mho and current gain 20, the voltage gain will

A. $1.5G$

B. $\frac{1}{3}G$

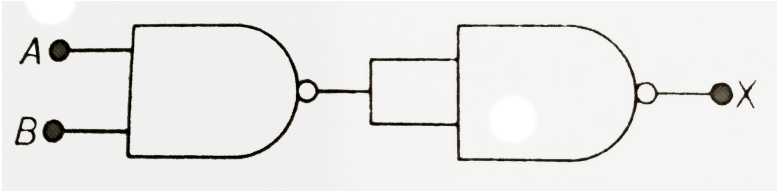
C. $\frac{5}{4}G$

D. $\frac{2}{3}G$

Answer: D

Watch Video Solution

18. The output (X) of the logic circuit shown in figure will be



A. $X = \underline{A}.\, B$

B. $X = A.\, B$

C. $X = \underline{A} + B$

D. $X = \underline{A}.\ B$

Answer: B

Watch Video Solution

19. Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is

A. $0.25A$

B. $0.5A$

C. 0.75 A`

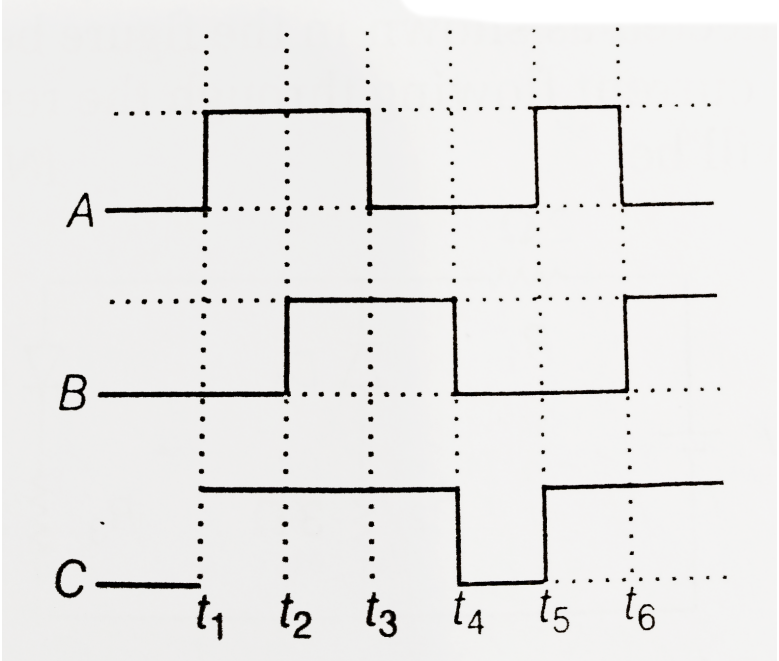
D. Zero

Answer: B

Watch Video Solution

20. The figure shows a logic circuit with two inputs A and B and the output C. The voltage wave forms across A, B and C are as given. The

logic circuit gate is



A. AND gate

B. NAND gate

C. OR gate

D. NOR gate

Answer: C

Watch Video Solution

21. In a CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 2V. If the base resistance is $1k\Omega$ and the current amplification of the transistor is 100, the input signal voltage is

A. $1mV$

B. $10mV$

C. $0.1v$

D. $1.0V$

Answer: B

 Watch Video Solution

22. C and Si both have same lattice structure, having 4 bonding electrons in each. However, C is insulator whereas Si is intrinsic semiconductor. This is because

A. The four bonding electrons in the case of C lie in the second orbit, whereas in the case of Si they lie in the third.

B. The four bonding electrons in the case of C lie in the third orbit, whereas for Si they lie in the fourth orbit.

C. In case of C the valence band is not completely filled at absolute zero temperature.

D. In case of C the conduction bans is partly filled even at absolute zero temperature.

Answer: A

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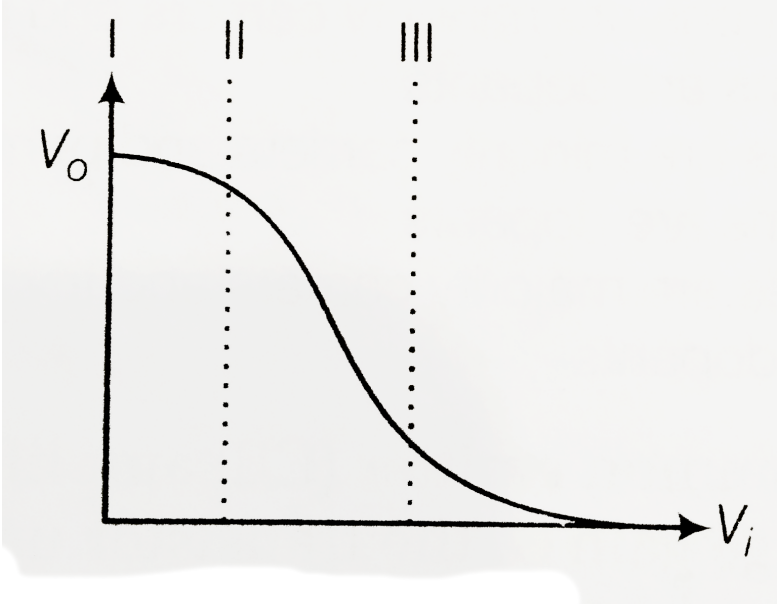
23. Transfer characteristic [output voltage (V_0) vs input voltage (V_i) for a base biased transistor in CE configuration is as shown in the figure. For using transistor as a switch, it is

used



A. In region II

B. In region I

C. In region III

D. Both in region (I) and (III)

Answer: D

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24. The input resistance of a silicon transistor is 100Ω. Base current is changed by $40\mu A$ which results in a change in collector current by 2 mA. This transistor is used as a common emitter amplifier with a load resistance of $4K\Omega$. The voltage gain of the amplifier is-

A. 2000

B. 3000

C. 4000

D. 1000

Answer: A

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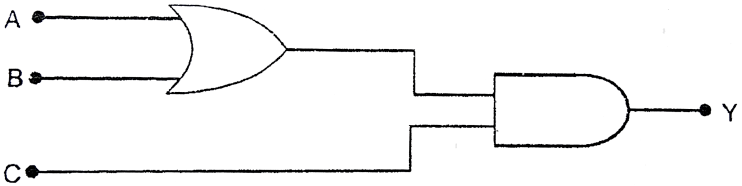
25.



To get an output $Y = 1$ in given circuit which of the following input will be correct:

A. 1,0,0

B. 1,0,1

C. 1,1,0

D. 0,1,0

Answer: B

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26. A transistor is operated in common emitter configuration at $V_c = 2V$ such that a change in the base current from $100\mu A$ to $300\mu A$

produces a change in the collector current from $10mA$ to $20mA$. The current gain is

A. 25

B. 50

C. 75

D. 100

Answer: B

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27. If a small amount of antimony is added to germanium crystal

A. Its resistance is increased

B. It becomes a p-type semiconductor

C. The antimony becomes an acceptor atom

D. There will be more free electrons than holes in the semiconductor

Answer: D

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28. In forward biasing of the p-n junction

A. The positive terminal of the battery is connected to p-side and the depletion region becomes thin

B. The positive terminal of the battery is connected to p-side and the depletion region becomes thick

C. The positive terminal of the battery is connected to n-side and the depletion region becomes thin

D. The positive terminal of the battery is connected to n-side and the depletion region becomes thick

Answer: A

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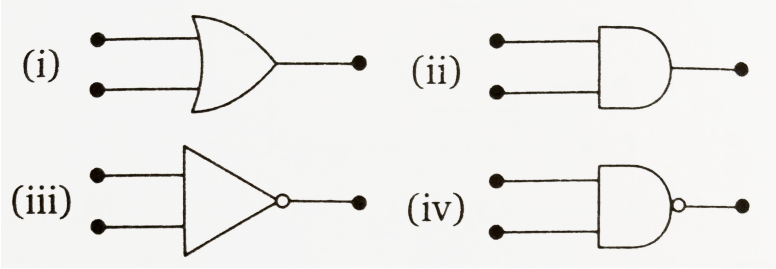
29. Symbolic representation of four logic gates are shown as

(i) 

Pick out which ones are for AND, NAND and NOT gates, respectively.

A. $(ii), (iv)$ and (iii)

B. $(ii), (iii)$ and (iv)

C. $(iii), (ii)$ and (i)

D. $(iii), (ii)$ and (iv)

Answer: A

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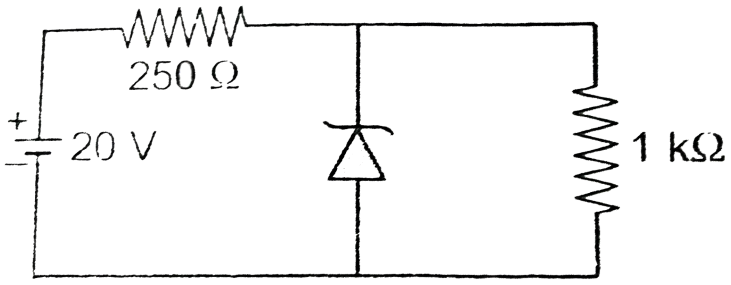
30. A zener diode having breakdown voltage equal to 15V, is used in a voltage regulator circuit shown in figure. Find the current through the diode.



A. $20mA$

B. $5mA$

C. $10mA$

D. $15mA$

Answer: B

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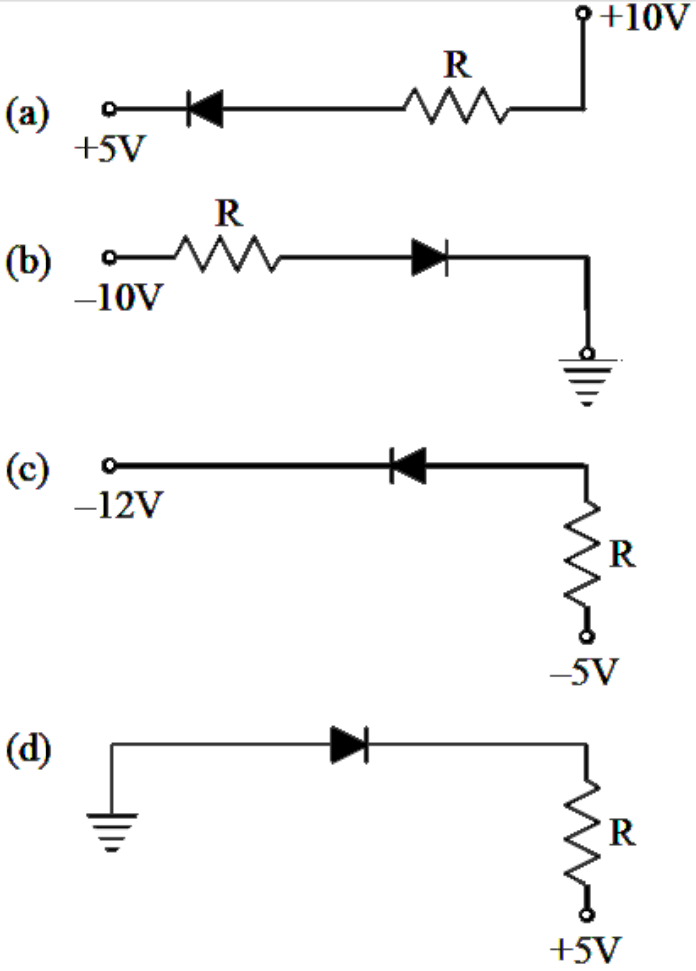
31. In the following figure, the diodes which are forwards biased are :



A. (b) and (d)

B. (a), (b) and (d)

C. (c) only

D. (c) and (a)

Answer: D

 Watch Video Solution

32. Pure Si at 500 K has equal number of electron (n_e) and hole (n_h) concentration of $1.5 \times 10^{16} m^{-3}$. Doping by indium increases n_h to $4.5 \times 10^{22} m^{-3}$. The doped semiconductor is of :

A. n-type with electron concentration

$$n_e = 2.5 \times 10^{23} m^{-3}$$

B. p-type having electron concentrations

$$n_e = 5 \times 10^{9} m^{-3}$$

C. n-type with electron concentration

$$n_e = 2.5 \times 10^{22} m^{-3}$$

D. Semi-conductor crystal

Answer: B

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33. A common emitter amplifier has a voltage gain of 50, an input impedance of 100Ω and an output impedance of 200Ω. The power gain the amplifier is

A. 50

B. 500

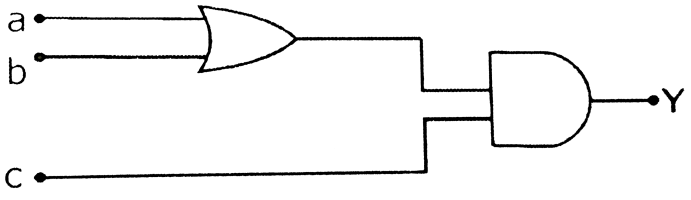
C. 1000

D. 1250

Answer: D

Watch Video Solution

34. To get an output 1 from the circuit shown in figure the input must be :



A. 0,1,0

B. 0,0,1

C. 1,0,1

D. 1,0,0

Answer: C

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35. The device that can act as a complete electronic circuit is

A. Zener diode

B. Junction diode

C. Integrated circuit

D. Junction transistor

Answer: C

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36. Which of the following statement is false?

A. The resistance of intinisic semiconductor decreases with increase of temperature

B. Puri Si doped with trivalent impurities gives a p-type semiconductor

C. Majority carriers in a n-type semiconductors are holes

D. Miniority carriers in a p - type semiconductor are electrons

Answer: C

Watch Video Solution

37. Which one of the following bonds produces a solid that refleets light in the light in the visible region and whose electrical

conductivity decreases with temperature and has high melting point ?

A. Covalent bonding

B. Metallic bonding

C. Van der Waal's bonding

D. Ionic bonding

Answer: B

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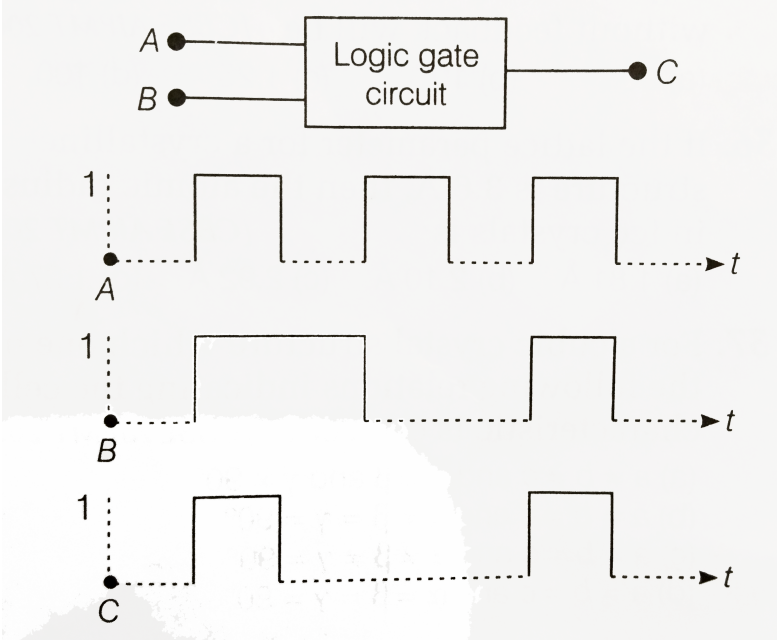
38. The following figure shows a logic gate circuit with two inputs A and B and the output C. The voltage waveforms of A, B and C are as shown below



The logic circuit gate is

A. NOR gate

B. OR gate

C. AND gate

D. NAND gate

Answer: D

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39. The vapour pressure of two pure liquids A and B that forms an ideal solution are 300 and 800 torr respectively at temperature T. A mixture of the vapours of A and B (for which the mole fraction of A is 0.25) is slowly compressed at temperature T. The vapour pressure of this condensate is meansured to be 'P'. What is the value of 684-P ?

A. (d), (a)

B. (a), (b)

C. (b), (c)

D. (c), (d)

Answer: C

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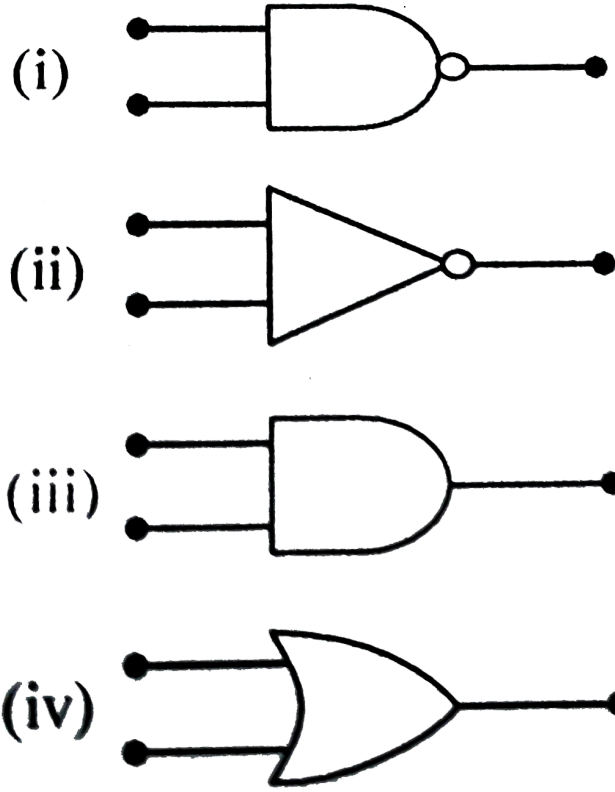
40. The symbolic representation of four logic gates are given below :



The logic symbols for OR, NOT and NAND gates are respectively :

A. (iv), (i) ,(iii)

B. (iv),(ii), (i)

C. (i), (iii), (iv)

D. (iii), (iv), (ii)

Answer: B

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41. A p-n Photodiode is fabricated from a semiconductor with a band gap of 2.5 eV. The signal wavelength is

A. 4000 nm

B. 6000 nm

C. 4000 A

D. 6000 A

Answer: C

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42. A transistor is operated in common-emitter configuration at $V_c = 2$ volt such that a change in the base current from $100\mu A$ to $200\mu A$ produces a change in the collector

current from $5mA$ to $10mA$. The current gain is

A. 100

B. 150

C. 50

D. 75

Answer: C

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43. Sodium has body centred packing. Distance between two nearest atoms is 3.7 Å. The lattice parameter is :

A. $4.3A$

B. $3.0A$

C. $8.6A$

D. $6.8A$

Answer: A

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44. If the lattice parameter for a crystalline structure is 3.6Å, then the atomic radius of fcc crystals is

A. $1.27A$

B. $1.81A$

C. $2.10A$

D. $2.92A$

Answer: A

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45. The voltage gain of an amplifier with 9% negative feedback is 10. The voltage gain without feedback will be

A. 100

B. 90

C. 10

D. 1.25

Answer: A

Watch Video Solution

46. The circuit

A. OR gate

B. AND gate

C. NAND gate

D. NOR gate

Answer: D

Watch Video Solution

47. A p-n photodiode is made of a material with a band gap of $2.0eV$. The minimum frequency of the radiation that can be absorbed by the material is nearly

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

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

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

D. $1 \times 10^{14} Hz$

Answer: C

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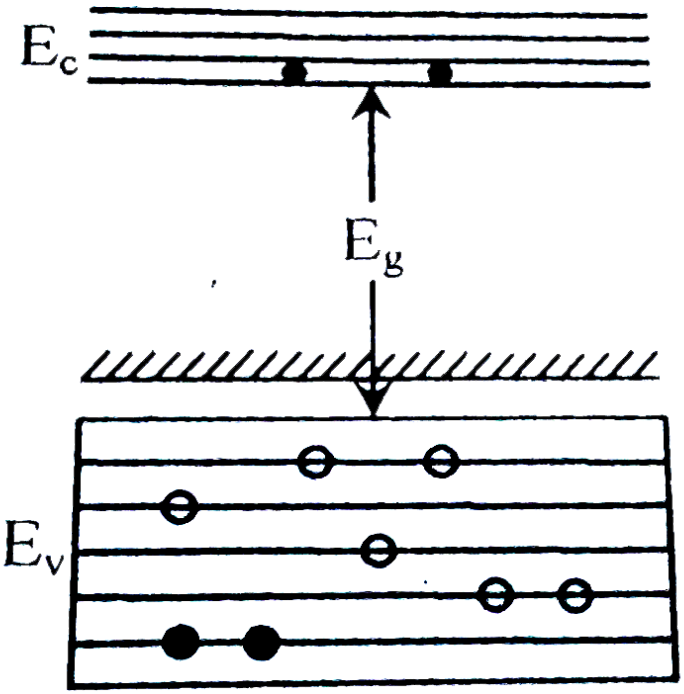
48. In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is:-



A. An n-type semiconductor

B. A p-type semiconductor

C. An insulator

D. A metal

Answer: B

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49. A common emitter amplifier has a voltage gain of 50, an input impedance of 100Ω and an

output impedance of 200Ω. The power gain the amplifier is

A. 100

B. 500

C. 1000

D. 1250

Answer: D

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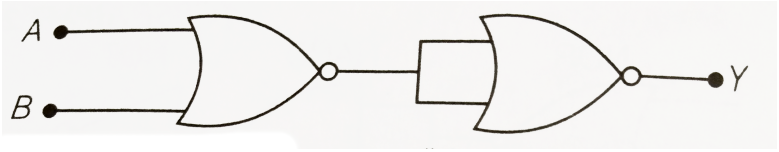
50. In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table



A.

B.

C.

D.

Answer: C

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51. For a cubic crystal structure which one of the following relation indicating the cell characteristic is correct ?

A. $a = b = c$ and $\alpha = \beta = \gamma = 90^\circ$

B. $a \neq b \neq c$ and $\alpha \neq \beta \neq \gamma \neq 90^\circ$

C. $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$

D. $a = b = c$ and $\alpha \neq \beta \neq \gamma \neq 90^\circ$

Answer: A

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52. A transistor is operated in common emitter configuration at constant collector voltage $V_c = 1.5V$ such that a change in the base current from $100\mu A$ to $150\mu A$ produces a change in the collector current from $5mA$ to $10mA$. The current gain (β) is

A. 67

B. 75

C. 100

D. 50

Answer: C

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53. A forward biased diode is

A. 

B. 

C. 

D. 

Answer: D

Watch Video Solution

54. The following figure shows a logic gate circuit with two inputs A and B and the output C. The voltage waveforms of A, B and C are as given The logic circuit is:

A. AND gate

B. NAND gate

C. NOR gate

D. OR gate

Answer: A

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55. Application of forward bias to p-n junction

A. Increases the number of donors on the n-side

B. Increases the electric field in the depletion zone

C. Increases the potential difference across the depeltion zone

D. Widens the depletion zone

Answer: A

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56. Zener diode is used for:-

A. Producing oscillations in an oscillator

B. Amplification

C. Stabilisation

D. Rectification

Answer: C

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57. 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: A

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58. Choose the false statement from the following.

A. Substances with energy gap of the order of 10 eV are insulators

B. The conductivity of a semiconductor increases with increase in temperature

C. In conductors the valence and conduction bands may overlap

D. The resistivity of a semiconductor increases with increase in temperature.

Answer: D

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59. Copper has face-centered cubic (fcc) lattice with interatomic spacing equal to 2.54Å. The value of lattice constant for this lattice is

A. $1.27A$

B. $5.08A$

C. $2.54A$

D. $3.59A$

Answer: D

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60. The cations and anions are arranged n alternate form in:

A. Metallic crystal

B. Ionic crystal

C. Covalent crystal

D. Semi-conductor crystal

Answer: B

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61. In semiconductors at a room temperature

A. The valence band is partially empty and the conduction band is partially filled

B. The valence band is completely filled and the conduction band is partially filled

C. The valence band is completely fille

D. The conduction band is completely empty

Answer: A

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62. In good conductors of electricity the type of bonding that exist is

A. Metallic

B. van der Waal's

C. Ionic

D. Covalent

Answer: A

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63. In an insulator, the forbidden energy gap between the valence band and conduction band is of the order of

A. $1MeV$

B. $0.1MeV$

C. $1eV$

D. $5eV$

Answer: D

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

A. $10^{-10}m$

B. $10^{-8}m$

C. $10^{-6}m$

D. $10^{-4}m$

Answer: C

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65. Pure Si at 300 K has equal electron (n_e) and hole (n_h) concentrations of $1.5 \times 10^{18} m^{-3}$. Doping by indium increases n_h to $4.5 \times 10^{22} m^{-3}$. Calculate n_e in the dipoed Si.

A. $1.5 \times 10^{16} m(-3)$

B. $3.0 \times 10^{22} m(-3)$

C. $5 \times 10^{9} m(-3)$

D. $3 \times 10^{6} m(-3)$

Answer: C

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66. In a reverse biased p-n junction, when the applied bias voltages is equal to the breakdown voltage, then

A. Current remains constant while voltage increase sharply

B. Voltage remains constant while current increases sharply

C. Current and voltage increase

D. Current and voltage decrease

Answer: B

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67. In the case of forward biasing of PN-junction, which one of the following figures correctly depicts the direction of flow of carriers?

A. 

B. 

C. 

D. 

Answer: B

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68. When arsenic is added as an impurity to silicon, the resulting material is

A. n-typw conductor

B. n-type semicnductor

C. p-type semiconductor

D. p-type conductor

Answer: B

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69. To obtain a p-type germanium semiconductor, it must be doped with

A. Indium

B. Phosphorus

C. Aresenic

D. Antimony

Answer: A

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70. The cause of the potential barrier in a p-n diode is

A. Depletion of negative charges near the junction

B. Concentration of positive charges near the junction

C. Depletion of positive charges near the junction

D. Concentration of positive and negative charges near the junction

Answer: D

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71. A semiconducting device is connected in a series in circuit with a battery and a resistance. A current is allowed to pass through the circuit. If the polarity of the battery is reversed, the current drops to almost zero. The device may be

A. A p-type semi-conductor

B. An intrinsic semi-conductor

C. A p-n junction

D. An n-type semi-conductor

Answer: C

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72. $p-n$ junction diode can be used as

A. Condenser

B. Oscillator

C. Amplifier

D. Rectifier

Answer: D

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73. In p-type semiconductor, the major charge carriers are:

A. Protons

B. Electrons

C. Holes are majority carriers and trivalent atoms are dopants

D. Neutrons

Answer: C

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74. In forward bias the width of depletion layer in a p-n junction diode

A. Remains constant

B. Decreases

C. Increases

D. First (1) then(2)

Answer: B

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75. Depletion layer consists of

A. Mobile ions

B. Protons

C. Electrons

D. Immobile ions

Answer: D

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76. In a junction diode, the holes are due to

A. Extra electrons

B. Neutrons

C. Protons

D. Missing of electrons

Answer: D

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77. In a PN junction : -

A. High potential at N side and low potential at P side

B. High potential P side and low potential at N side

C. P and N both are at smae potential

D. Undetermined

Answer: A

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78. For the given circuit of P-N junction diode which is correct : -

A. In forward bias the voltage across R is V

B. In reverse bias the voltage across R is V

C. In forward bias the voltage across R is 2V

D. In reverse bias the voltage across R is 2V

Answer: A

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79. Reverse bias applied to a junction diode

A. Lowers the potential barrier

B. Raises the potential barrier

C. Increases the majority carrier current

D. Increases the minority carrier current

Answer: B

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

A. Diode design

B. Temperature

C. Forward bias

D. Doping density

Answer: A

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

A. The barrier voltage at the p-n junction

B. The intensity of the light falling on the cell

C. The frequency of the light falling on the cell

D. The voltage applied at the p-n junction

Answer: B

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82. In a zener diode, break down occurs in reverse bias due to

A. thin depletion region

B. Internal field emission

C. High doping concentration

D. All of these

Answer: B

83. In a p-n junction, depletion region contains

A. No charges at all

B. Equal number of conduction electrons and holes

C. Equal number of donor and acceptor ions

D. More conduction holes than electrons

Answer: C

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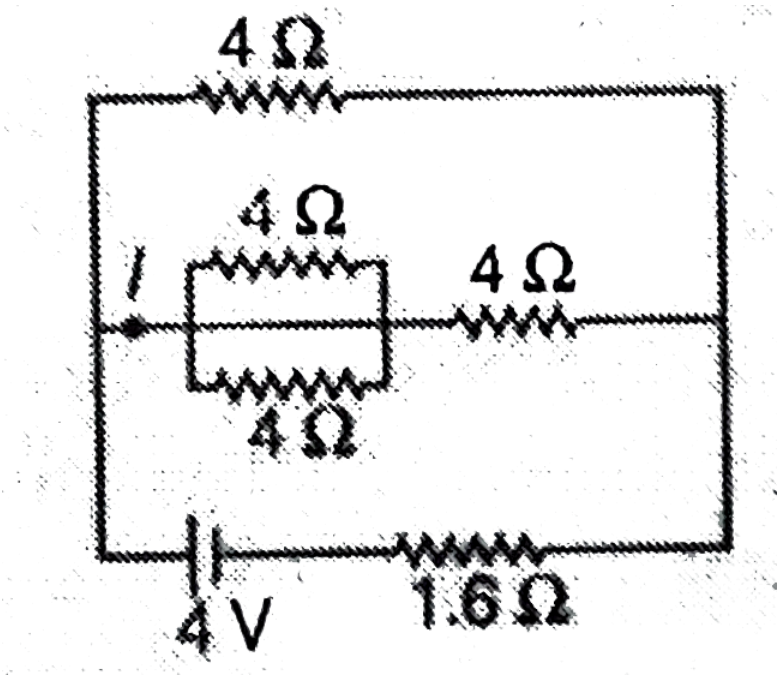
84. In the given circuit , the value of current is



A. 1 ampere

B. $0.1 ampere$

C. $0.5 ampere$

D. Zero

Answer: B

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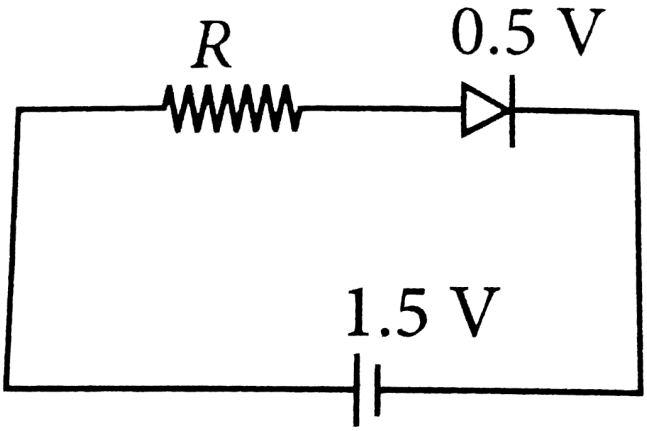
85. The diode used in the circuit shown in the figure has a constant voltage drop at 0.5 V at all currents and a maximum power rating of 100 mW. What should be the value of the resistor R, connected in series with diode, for

obtaining maximum current ?



A. 6.76Ω

B. 20Ω

C. 5Ω

D. 5.6Ω

Answer: C

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86. The current in the circuit will be

A. $\frac{5}{10}A$

B. $\frac{5}{50}A$

C. $\frac{5}{10}$ A

D. $\frac{5}{20}$ A

Answer: B

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

A. 25 Hz

B. 50 Hz

C. $70.7Hz$

D. 100 Hz

Answer: D

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88. The peak voltage in the output of a half wave diode rectifier fed with a sinusoidal signal without filter is 10V. The d. c. component of the output voltage is :-

A. $10\sqrt{2}V$

B. $\frac{10}{\pi}V$

C. $10V$

D. $\frac{20}{\pi}V$

Answer: B

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

A. Electrons move from collector to base

B. Holes move from collector to base

C. Holes move from base to collector

D. Electrons move from emitter to base

Answer: D

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90. An oscillator is nothing but an amplifier with

A. Positive feedback

B. Negative feedback

C. Voltage gain

D. No feedback

Answer: A

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91. The correct relationship between the two current gains α and β in a transistor is

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

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

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

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

Answer: D

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92. The transfer ratio of a transistor is 50. The input resistance of the transistor when used in the common -emitter configuration is $1k\Omega$. The peak value for an $A.C.$ input voltage of $0.01V$ peak is

A. $0.25mA$

B. $0.01mA$

C. $100\mu A$

D. $500\mu A$

Answer: D

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93. For a common emitter circuit if $\frac{l_C}{l_E} = 0.98$ then current gain for common emtter circuit will be

A. 49×10^{-2}

B. 98

C. 4.9×10^{1}

D. 25.5

Answer: C

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94. In an n-p-n transistor working in active mode, the depletion region

A. Both collector and emitter are positive with respect to the base

B. Collector is positive and emitter is negative with respect to the base

C. Collector is positive and emitter is at same potential as the base

D. Both collector and emitter are negative with repect to the base

Answer: B

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95. A transistor -oscillator using a resonant circuit with an inductor L (of negligible resistance) and a capacitor C in series produce oscillations of frequency f. If L is doubled and C is changed to 4 C, the frequency will be

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

B. $\frac{f}{4}$

C. $8f$

D. $\frac{f}{2}\sqrt{2}$

Answer: D

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96. In an n-p-n transistor working in active mode, the depletion region

A. Is not formed

B. At emitter - base junction is wider than that at collector - base junction

C. At emitter - base junction is thinner than that at collector-base junction

D. At the two junctions have equals width

Answer: C

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97. A transistor has a current amplification factor of 60. In a CE amplifier, input resistance is $1k\Omega$ and output voltage is $0.01V$. The transconductance is (in SI units)

A. 10^{-5}

B. 6×10^{-2}

C. 6×10^{4}

D. 10

Answer: B

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98. To use a transistor as an amplifier

A. Emitter - base and collector-base junctions are forward biased

B. Emitter - base is forward biased junctions collector-base is reverse biased

C. Emitter - base and collector-base junctions both are reverse biased

D. Emitter - base is reverse biased collector-base is forward biased

Answer: B

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99. In a common emitter configuration base current is $40\mu A$ and current gian is 100. The collector current will be

A. $4mA$

B. $4\mu A$

C. $1mA$

D. $1\mu A$

Answer: A

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100. Which of the following gates correspond to the truth table given below ?

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

A. NAND

B. NOR

C. XOR

D. OR

Answer: A

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101. A truth table is given, which of the following has this type of truth table?

A. AND gate

B. OR gate

C. XOR gate

D. NOR gate

Answer: D

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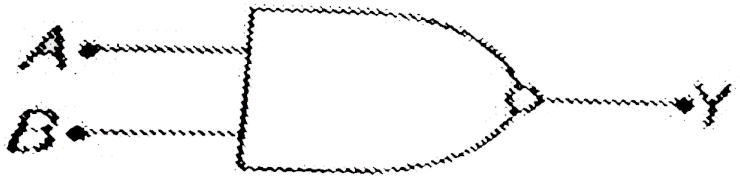
102. The given symbol represents



A. AND gate

B. NOR gate

C. NAND gate

D. OR gate

Answer: C

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103. Which of the following gates will have an output of 1?

A. 

B. 

C. 

D. 

Answer: D

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104. Following diagram performs the logic function of

A. AND gate

B. NAND gate

C. OR gate

D. XOR gate

Answer: A

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105. The output of OR gate is 1 :-

A. If both inputs are zero

B. If either or both inputs are 1

C. Only if both inputs are 1

D. If either input is zero

Answer: B

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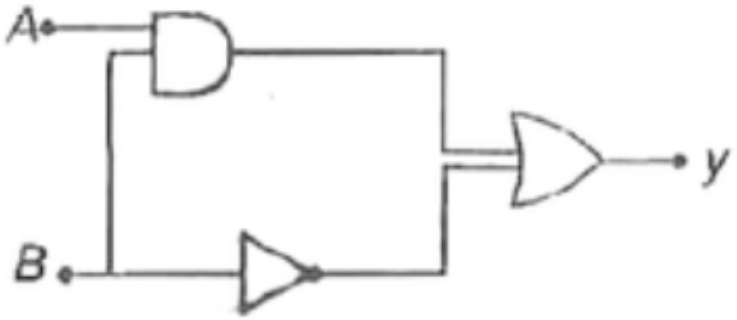
106. In the figure shown if A = 1 and B = 0 then y will be



A. 0

B. 1

C. 2

D. Any of these

Answer: B

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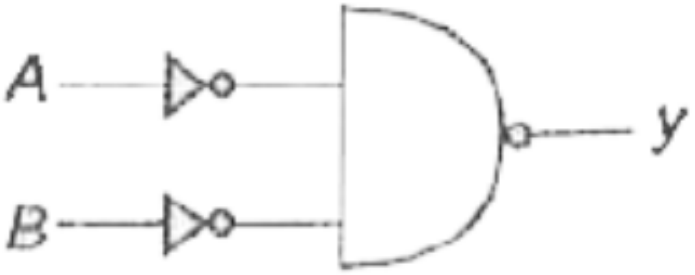
107. Symbol given below represents



A. AND

B. OR

C. NAND

D. NOR

Answer: B

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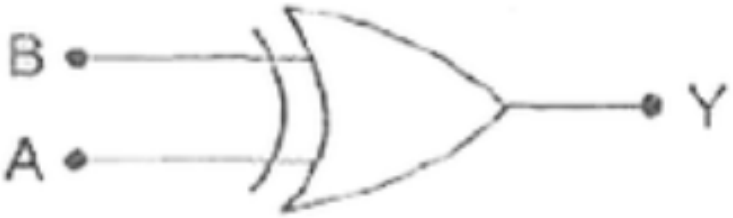
108. The given symbol represents the



A. AND gate

B. NAND gate

C. NOR gate

D. XOR gate

Answer: D

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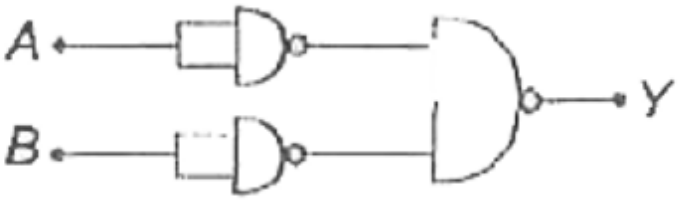
109. Output Y of the gate shown in figure



A. $Y = A.B$

B. $Y = A + B$

C. Y = A oplus B

D. $Y = \underline{A}$ oplus B

Answer: B

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110. Which of the following is the boolean expression for XOR gate?

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

B. $y = \underline{AB}.\ \underline{AB}$

C. $y = (A + \underline{B}).\ (\underline{A} + B)$

D. $y = (AB)(\underline{A}B)$

Answer: A

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Assignment Section D Assertion Reason Type Question

1. Intrinsic semiconductor at absolute zero temperature is a

A. If both Assetion & Reason are true and the reason is the not the correct explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: C

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2. Assertion: When base region has large width, the collector current increases.

Reason: Electron hole combination in base result in increase of base current.

A. If both Assetion & Reason are true and the reason is the not the correct explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation

of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: A

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3. A: The conductivity of a pure semiconductor increases on doping

R: Doping causes the reduction in bond strength.

A. If both Assetion & Reason are true and the reason is the not the correct explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation

of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: C

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4. Assertion: Semiconductor do not obey Ohm's law.

Reason: Current is dertemined by the rate of flow of charge carriers.

A. If both Assetion & Reason are true and the reason is the not the correct explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation

of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: A

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5. A: When a pure semiconductor is doped with a pentavalent impurity, the number of conduction electrons is increased while the number of holes is decreased

R: Some of the holes get recombined with the conduction electrons as the concentration of the conduction electrons is increased.

A. If both Assetion & Reason are true and the reason is the not the correct

explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: A

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6. Assertion : In transistor common emitter mode as an amplifier is prefered over common base mode.

Reason: In common emitter mode the input signal is connected in series with the voltage applied to the base emitter function.

A. If both Assetion & Reason are true and the reason is the not the correct

explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: B

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7. Assertion : The energy gap between the valence band and conduction band is greater in silicon than in germanium.

Reason : Thermal energy produces fewer minority carriers in silicon than in germanium.

A. If both Assetion & Reason are true and the reason is the not the correct

explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: B

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8. Assertion : Light emitting diode (LED) emits spontaneous radiation.

Reason : LED are forward biased p-n junctions.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation

of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: A

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9. Assertion: $NAND$ or NOR gates are called digital building blocks.

Reason: The repeated use of $NAND$ (or NOR) gates can produce all the basic or complicated gates.

A. If both Assetion & Reason are true and the reason is the not the correct explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: A

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10. A n-p-n transistor conducts when

A. If both Assetion & Reason are true and the reason is the not the correct explanation of the assertion , then mark (1)

B. if both Assertion & Reason are true but the reason is not the correct explanation of the assertion ,then mark (2)

C. If Assertion is true statement but reason is false, then mark (3).

D. If both Assertion and reason are false statements, then mark (4)

Answer: B

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