PHYSICS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR PHYSICS

SEMICONDUCTOR ELECTRONICS

Illustration

1. The energy gap of germanium is 1.28 eV. What is the maximum wave length at which germanium will begin absorbing energy.

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2. Pure Si at 400K has equal electron (n_e) and hole (n_h) concentrations of $3 \times 10^{16} m^{-3}$. Doping by indium, n_h increases to $6 \times 10^{22} m^{-3}$. Calculate n_e in the doped Si.

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3. Suppose a pure Si crystal has 6×10^{28} atoms m^{-3}. It is doped by 1ppm concentration of pentavalent As. Calculate the number of electrons and holes, Given that $n_i = 0.5 \times 10^{16} m^{-3}$

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4. Why Carbon acts as insulator while Silicon and Germanium act as semiconductors?

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5. Find voltage across resistor, and current through diode.

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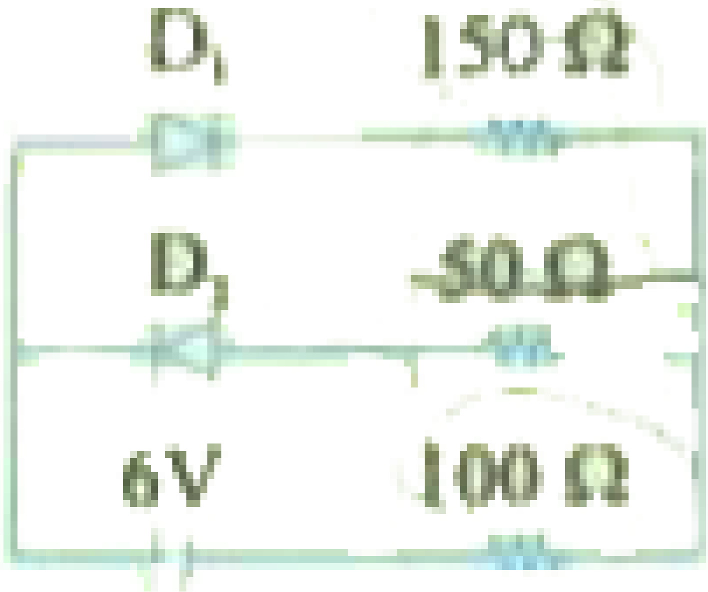
6. If each diode forward resistance is 50ω then find current through the 100ω resistor in the given circuit.



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7. Is reverse saturation current of a diode independent of reverse bias voltage?

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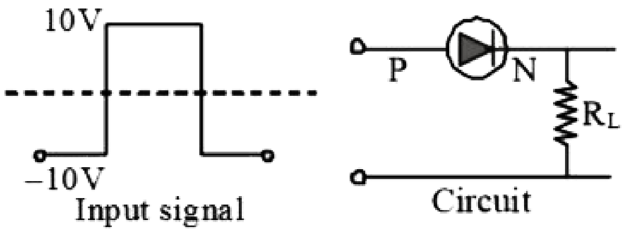
8. If the following input signal is sent through a P-N junction diode, then the output signal across R_L will be -



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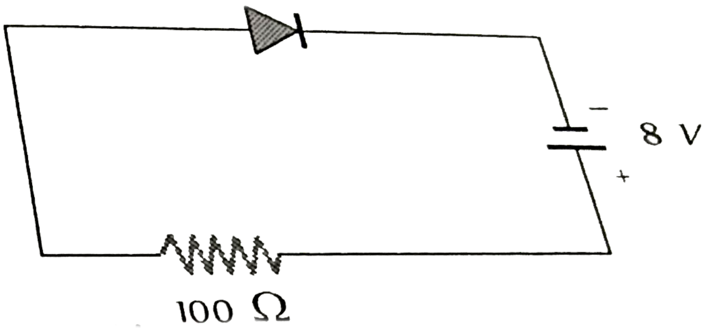
9. A source voltage of 8 V drives the diode in fig. through a current- limiting resistor of 100 ohm . Then the magnitude of the slope load line on the V - I characteristics of the diode is



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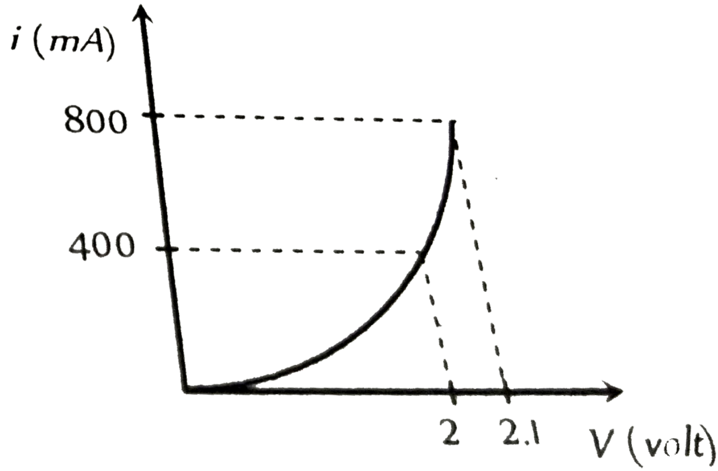
10. The i - V characteristic of a P - N junction diode is shown below. The approximate dynamic resistance of the P - N junction when a forward bias of 2 volt is applied



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11. In half wave rectifier a p-n diode with internal resistance 20Ω is used. If the load resistance of $2k\Omega$ is used in the circuit, then find the efficiency of this half wave rectifier.

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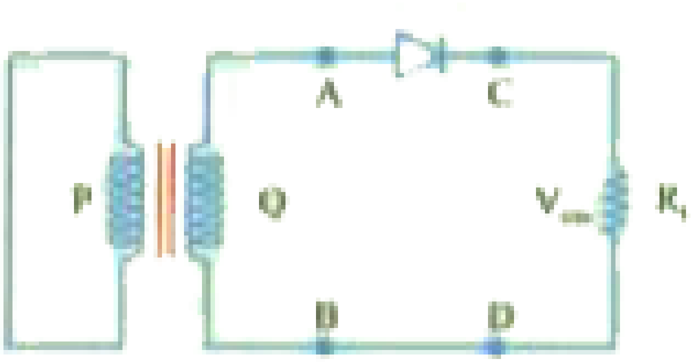
12. In the half-wave rectifier circuit shown, which one of the following waveform is true for V_{CD} the output across C and D?



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13. In a zener regulated power supply, a zener diode with $V_Z = 5.0V$ is used for regurlation. The load current is to be 2.0 mA and the unregulated input is 10.0V. What should be the value of series resistance R_S?

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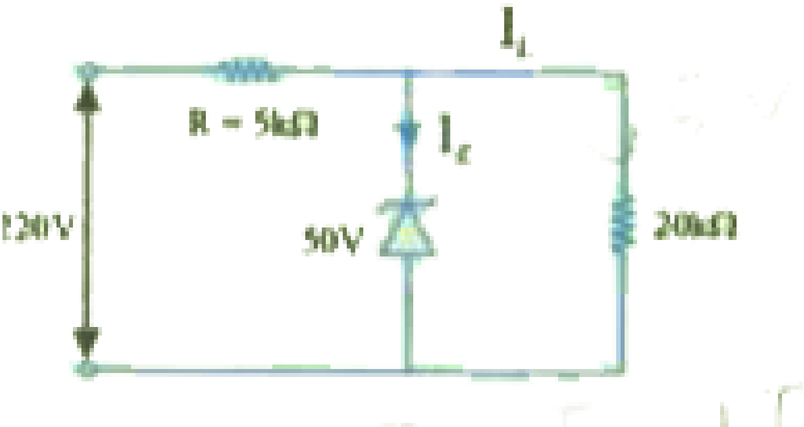
14. From the zener diode circuit shown in the figure, find (1) the output voltage (2) the voltage drop across series resistance and (3) the current through zener diode.



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15. The current in the forward bias is unknown to be more (~mA) than the current in the reverse bias (~μA). What is the reason then to operate the photo diodes in reverse bias ?

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

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17. The base current is $100\mu A$ and collector current is 3 mA

(a) Calculate the values of β, I_e and α

(b) A change of $20\mu A$ in the base current produces a charge of 0.5 mA in the collector current. Calculate β_{ac}

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18. For a CE transistor amplifier, the audio signal voltage across the collector resistance of $4.0k\Omega$ is 4.0V. suppose the current

amplification factor of the transistor is 100. What should be the value of R_B in series with supply of 2.0 V if the de base current has to be 10 times the signal current. Also calculate the dc drop across the V_{BB} collector resistance.

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19. In a transistor, the value of β is 60 Calculate the value of α .

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20. Why the emitter is forward biased and the collector is reverse biased in a transistor?

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21. In a transistor, connected in common emitter mode $R_0 = 5k\Omega$, $R_i = 1k\Omega$, $I_C = 1mA$, $I_B = 40\mu A$. Find the voltage gain.

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22. Explain why a transistor is preferred in CE configuration over the CB configuration?

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23. In a negative feedback amplifier, the gain without feedback in 100, feed back ratio is $1/25$ and input voltage is $50mV$. Calculate

(i) gain with feedback

(ii) feedback factor

(iii) output voltage

(iv) feedback voltage

(v) new input voltage so that output voltage with feedback equals the output voltage without feedback.

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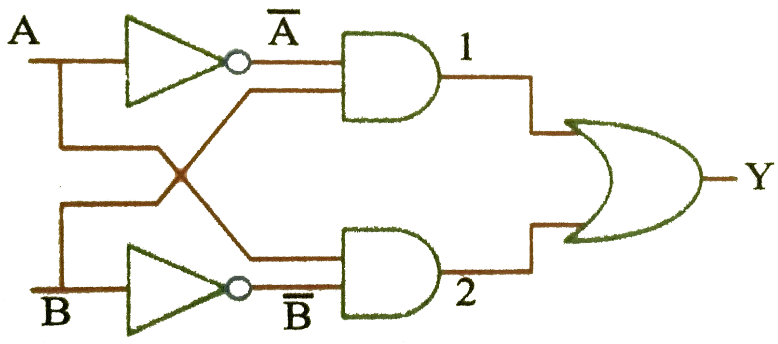
24. The Boolean expression of the output Y of the inputs A and B for the circuit shown in the fig.



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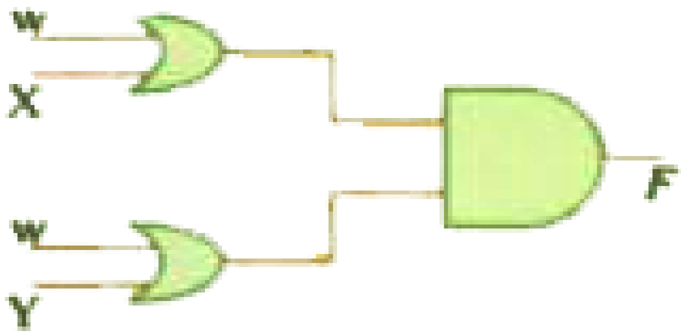
25. The diagram of a logic circuit is given below. The output of the circuit is reprsented by



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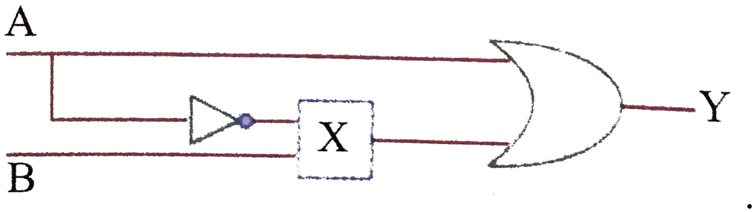
26. The logic circuit and its truth table are given, what is the gate X in the diagram

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



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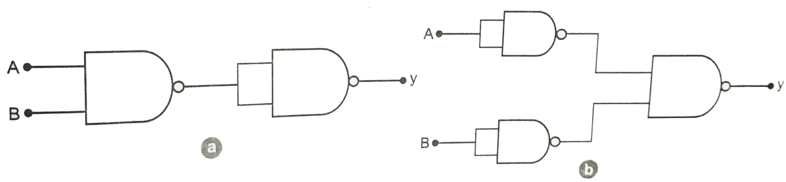
27. You are given two circuit as shown in Fig.and . Which consists of NAND gates. Identify the logic operation carried out by the two circuits.



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28. Take X and Y input waveforms. Sketch the output (Z) waveform abtained from AND gate as per the following conditions:

For $t \le t_1$	$X=0, Y=0$	Hence $Z=0$
For t_1 to t_2	$X=0, Y=0$	Hence $Z=0$
For t_2 to t_3	$X=1, Y=1$	Hence $Z=1$
For t_3 to t_4	$X=0, Y=0$	Hence $Z=0$
For t_4 to t_5	$X=0, Y=0$	Hence $Z=0$
For t_5 to t_6	$X=1, Y=0$	Hence $Z=0$
For t to t_6	$X=0, Y=1$	Hence $Z=0$

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29. Sketch the output Y from a OR gate having inputs X and Y as per the following conditions:

conditions:

For $t \le t_1$	$X = 0, Y = 0$	Hence $Z = 0$
For t_1 to t_2	$X = 1, Y = 0$	Hence $Z = 1$
For t_2 to t_3	$X = 1, Y = 1$	Hence $Z = 1$
For t_3 to t_4	$X = 0, Y = 1$	Hence $Z = 1$
For t_4 to t_5	$X = 0, Y = 0$	Hence $Z = 0$
For t_5 to t_6	$X = 1, Y = 0$	Hence $Z = 1$
For t to t_6	$X = 0, Y = 1$	Hence $Z = 1$

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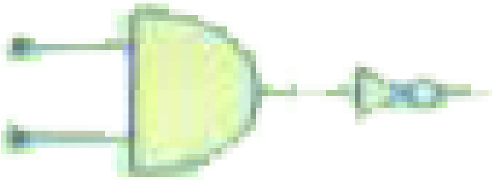
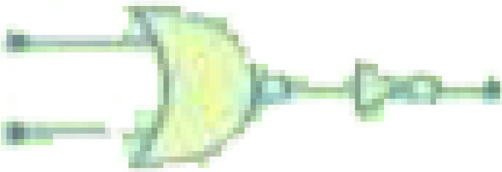
30. Which represents NAND gate?

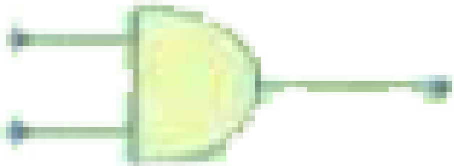
(1)



(2)



(3)



(4)

1. In $P-N$ junction, avalanche current flows in circuit when biassing is

A. forward

B. reverse

C. zero

D. excess

Answer: B

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2. A potential barrier of $0.50V$ exists across a $P-N$ junction. If the depletion region is $5.0 \times 10^{-7}m$, wide the intensity of the electric field in this region is

A. $1 \times 10^6 v / m$

B. $1 \times 10^5 v / m$

C. $2 \times 10^5 v / m$

D. $2 \times 10^6 v / m$

Answer: A

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3. The cut-in voltage for silicon diode is approximately

A. $0.2V$

B. $0.7V$

C. $1.1V$

D. Any value

Answer: B

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4. The width of forbidden gap in silicon crystal is $1.1eV$. When the crystal is converted into a N-type semiconductor the distance of Fermi level from conduction band is

A. Greater than $0.55eV$

B. Equal to $0.55eV$

C. Lesser than $0.55eV$

D. Equal to $1.1eV$

Answer: C

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5. In a pure silicon $(n_i = 10^{16} m^{-3})$ crystal at 300 $K, 10^{23}$ atoms of phosphorus are added per cubic meter. The new whole concentration will be

A. $10^{23} m^{-3}$

B. $10^{10} m^{-3}$

C. $10^{11} m^{-3}$

D. $10^{9} m^{-3}$

Answer: D

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Evaluate Yourself 2

1. In a full -wave rectifier circuit operating from 50 Hz mains frequency, what is the fundamental frequency in the ripple ?

A. 50 Hz

B. 100 Hz

C. 70 Hz

D. 25 Hz

Answer: B

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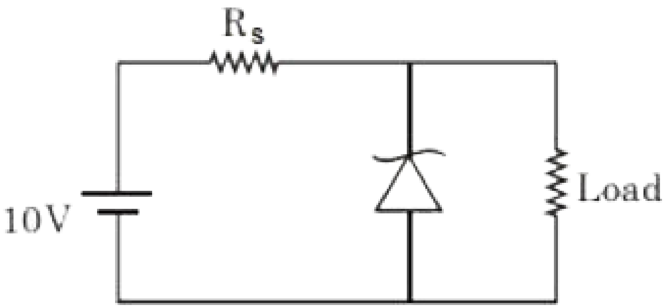
2. In a Zener regulated power supply a Zener diode with $V_Z = 6.0V$ is used for regulation. The load current is to be 4.0 mA and the unregulated input is 10.0 V. What should be the value of seriesresistor R_S ? Choose zener current to be 20 mA.



A. 167Ω

B. 6Ω

C. 1.5Ω

D. 3Ω

Answer: A

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3. In a full wave junction diode rectifier, the input a.c. voltage has r.m.s. value of $10V$. The transformer used is a step up one having transformation ratio $1:2$. Calculate the D.C. voltage in the rectified output voltage.

A. 16 V

B. 18 V

C. 36 V

D. 9 V

Answer: B

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Evaluate Yourself 3

1. A transistor has a current gain of 50. If the collector resistance is $5killo\Omega$and input resistance is $1killo\omega$, calculate output voltage if the input voltage is $0.01V$

A. $2.5V$

B. $1.25V$

C. $5V$

D. $7.5V$

Answer: A

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2. In an NPN transistor the collector current is $24mA$. If 80% of electrons reach collector it base current in mA is

A. 36

B. 26

C. 16

D. 6

Answer: B

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

A. 100

B. 1250

C. 500

D. 5000

Answer: D

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4. What type of feed back is required in an oscillator?

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5. State the relation for the voltage gain in terms of trans-conductance, using transistor as an amplifier.

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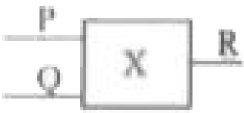
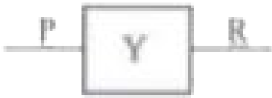
Evaluate Yourself 4

1. Logic gates X and Y have the truth tables shown below





P	Q	R
0	0	0
1	0	0
0	1	0
1	1	1

P	R
0	1
1	0

When the output of X is connected to the input of Y, the resulting combinaion is equivalent to a single

A. NOT gate

B. OR gate

C. NOR gate

D. NAND gate

Answer: D

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2. What will be the input of A and B for the Boolean expression $\overline{(A+B)}.\overline{(A.B)}=1$?

A. 0,0

B. 0,1

C. 1,0

D. 1,1

Answer: A

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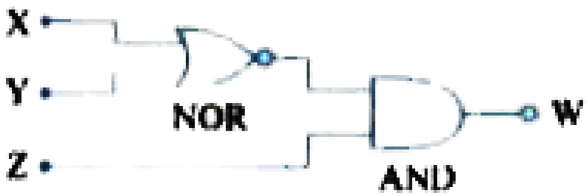
3. Output W is given by



A. $\overline{(X.Y)} + Z$

B. $\overline{(X+Y)}.\,Z$

C. $\overline{(X.Y)}.\,Z$

D. both (2) and (3)

Answer: B

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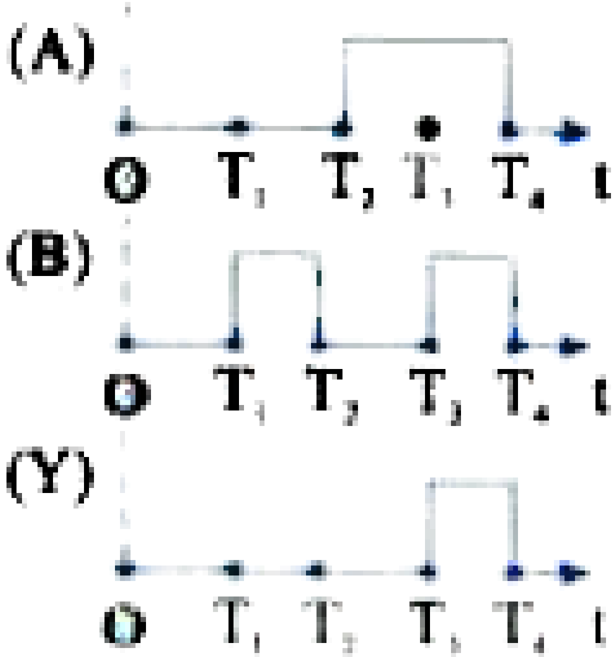
4. The input and the output wave form of a logic gate is shown in diagraam, then identify the logic gate :



A. AND gate

B. OR gate

C. NAND gate

D. NOT gate

Answer: A

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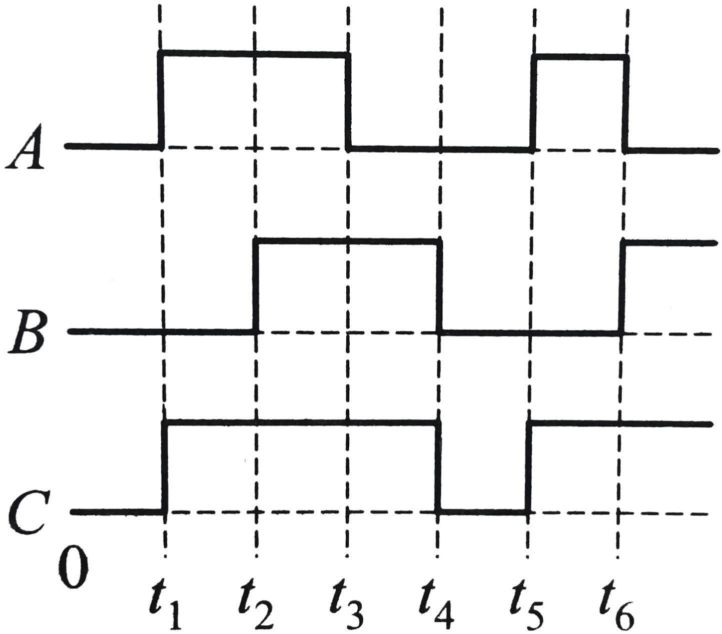
5. The figure shows a logic circuit with two inputs A and B and the output C. The voltage wave forms across A, B and C are as given. The logic circuit gate is



A. AND gate

B. NAND gate

C. OR gate

D. NOR gate

Answer: C

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C U Q Intrinsic And Extrinsic Semiconductors

1. 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 half filled and he conduction is half dilled

C. The valence band is completely filled

D. The conduction band is completely empty

Answer: A

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

A. Holes are majority carries and trivalent atoms are dopants.

B. Electrons are majority carries and trivalent atoms are dopants.

C. Electrons are minority carries and pantavalent atoms are dopants.

D. Holes are minority carries and pantavalent atoms are dopants.

Answer: D

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3. 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. $(E_g)_{Si} < (E_g)_{Ge} < (E_g)_C$

B. $(E_g)_C < (E_g)_{Ge} < (E_g)_{Si}$

C. $(E_g)_C > (E_g)_{Si} > (E_g)_{Ge}$

D. $(E_g)_C = (E_g)_{Si} = (E_g)_{Ge}$

Answer: C

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4. Identify the property which is not characteristic for a semiconductor ?

A. at a very law temperatures, it behaves, like an insulator

B. at higher temperatures two types of charge carriers will cause conductivity

C. the charge carries are electrons and holes in the valence band at higher temperature.

D. the semiconductor is electrically neutral.

Answer: C

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5. 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 electrons for conduction is negligibly small in all the three.

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

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

Answer: C

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6. When phosphorus and antimony are mixed in germanium, then

A. p-type semiconductor is formed

B. n-type semiconductor is formed

C. Both (a) and (b)

D. None of these

Answer: B

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7. An electrically neutral semiconductor has

A. equal amounts of negative and positive charges

B. no minority charge carries

C. no majority charge carries

D. no free charges

Answer: A

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8. There is no hole current in conductors because they have

A. high conductivity

B. high electron density

C. non valence band

D. overlapping of valence and conduction bands.

Answer: D

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9. In the insulators

A. the valenc band is partially filled with electrons

B. the conduction band is partially filled with electrons

C. the cunduction band is partially filled with electrons and valence band is empty

D. the conduction band is empty and the valence band is filled with electorns.

Answer: D

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10. In semiconductors the for bidden energy gap between $V. B$ and $C. B$ is of the order of

A. 1 eV

B. 5 eV

C. 1 keV

D. 1 MeV

Answer: A

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11. The level formed due to impurity atom, in the for hidden energy gap, very near to the valence band in a p-type semiconductor is called

A. acceptor level

B. donar level

C. conducion leve

D. forbidden level

Answer: A

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12. The bond in semiconductors is

A. covalent

B. inonic

C. metallic

D. hydrogen

Answer: A

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13. On increasing temperature, the conductivity of pure semiconductors

A. decreases

B. increases

C. remains unchanged

D. becomes zero

Answer: B

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

A. they carry negative charge

B. they are light

C. their mutuall collisions are less

D. they require low energy to continue their motion

Answer: D

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15. A semiconductor at $0K$ behaves as

A. conductor

B. insultator

C. super conductor

D. extrinsic semiconductor

Answer: B

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16. The valency of impurity element for making p-type semiconductors is

A. 5

B. 4

C. 3

D. 7

Answer: C

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17. In n-type semiconductors the electron concentration is equal to

A. density of donor atoms

B. density of acceptor atoms

C. density of both type of atoms

D. neither density of acceptor atoms nor density of donor atoms

Answer: A

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18. Which of the following statement is not true ?

A. the resistance of intrinsic semiconductors decreases with increases of temperature.

B. doping pure Si with trivalent impurities give p-type semiconductors

C. the majority charge carries in n-type semiconductors are holes

D. a p-n junction can act as a semiconductor diode

Answer: C

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19. p-type semi conduor is

A. negatively charged

B. positively charged

C. neutral

D. may be positive or negative

Answer: C

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20. An n-type semi- conductor is

A. negatively charged

B. positively charged

C. neutral

D. may be positive or negative

Answer: C

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21. An electric field is applied across a semiconductor. Let n be the number of charge carries. As temperature increases, n will

A. increase

B. decrease

C. does not change

D. may increase or decrease

Answer: A

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22. In a n-type semiconductor, the femi energy level lies

A. In the forbidden enery gap nearer to the conduction band

B. in the forbiddedn enery gap nearer to the valence band.

C. in the middle of forbidden energy gap

D. outside the forbidden energy gap

Answer: A

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23. An n-type and p-type silicon can be obtained by doping pure silicon with.

A. Aresenic and phosphrous

B. Indium and aluminium

C. Phosphorous and indium

D. aluminium and boron

Answer: C

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24. The width of forbidden gap in silicon crystal is $1.1 eV$. When the crystal is converted into a N-type semiconductor the distance of Fermi level from conduction band is

A. Greater than $0.55 eV$

B. Equal to $0.55 eV$

C. Lesser than $0.55 eV$

D. Equal to $1.1eV$

Answer: C

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25. In extrinsic semiconductors

A. the conduction band and valence band overlap

B. the gap between coduction band and valence band is near about 16eV

C. the gap between conduction band and valence band is near about 1 eV

D. The gap between conduction band and valence band will be 100 eV and more

Answer: C

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26. The element that can be used as acceptor impurity to dope silicon is

A. Antimony

B. Arsenic

C. Boron

D. phosphorous

Answer: C

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27. Among the following, the wrong statement on the case of semiconductor is

A. Resistivity is in between that of a conductor and insulator

B. Temperature coefficient of resistance is negative

C. Dopping increases conductivity

D. At absolute zero temperature it behaves like a conductor

Answer: D

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28. The value indicated by fermi energy level in an intrinsic semiconductor is

A. the average energy of electrons and holes

B. the average energy of electrons in conduction band

C. the energy of holes in valence band

D. the energy of forbidden region

Answer: A

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29. The conduction band and valency band of a good conductors are

A. well separated

B. just touch

C. very close

D. overlap

Answer: D

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30. Two pieces one of germinium and the other of aluminium are cooled from T_1K to T_2K. The resistance of

A. aluminium increases and that of germanium decrease

B. each of them decreases

C. aluminium decreases and that of germanium increases

D. each of them increases

Answer: C

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31. In intrinsic semiconductor at room temperature the no. of electrons and holes are

A. equal

B. zero

C. unequal

D. infinite

Answer: A

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32. Band gap in insulator is of the order

A. 6 eV

B. $0.60eV$

C. $-6eV$

D. 0 eV

Answer: A

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33. In p-type semiconductor conduction in due to

A. greater number of holes and less number of electrons

B. only electrons

C. only holes

D. greater number of electrons and less number of holes

Answer: A

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34. In an intrinsic semiconductor, the fermi energy level is

A. nearer to valence band than condcution band

B. equidistant from conduction band and valence band

C. nearer to conduction band than valence band

D. bisecing the conduction band

Answer: B

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35. With increase in temperature in an intrinsic semiconductor the ration of conduction electrons and holes is

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:3$

Answer: A

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36. To obtain n-type extrinsic semiconductor, the impurity element to be added to germanium should be of valency

A. 2

B. 5

C. 4

D. 3

Answer: B

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37. What are the majority carriers in a p-type semiconductor?

A. Electrons

B. Holes

C. Both

D. Impurities

Answer: B

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38. The objective of adding impurities in the extrinsic semiconductor is

A. to increases the conductivity of the semiconductor

B. to increases the density of total current carries

C. to increases the density of either holes or electrons

D. to eliminate the electron-hole pairs produced in intrinsic semiconductor.

Answer: C

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39. In intrinsic semiconductor conductivity is due to.

A. law

B. average

C. high

D. very low

Answer: A

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40. In intrinsic semiconductor conductivity is due to.

A. doping

B. breaking of covalent bonds

C. free electrons

D. holes

Answer: B

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41. When the conductivity of a semiconductor is only due to breaking of covalent bonds, the semi conductor is called.

A. n-type

B. p-type

C. instrinsic

D. extrinsic junction diode

Answer: C

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42. The potential barrier at PN junction is due to

A. fixed acceptor and donor ions on either side of the junction

B. minority carries on either side of the junction

C. majority carriers on eitter side of the junction

D. both majority and minority carries on either side of junction.

Answer: A

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43. A PN junction diode cannot be used

A. as rectifer

B. for converting light energy to electric energy

C. for getting light radiation

D. for increasing the amplitude of an ac signal

Answer: D

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44. $p-n$ junction diode acts as

A. ohmic resistance

B. non-ohmic resistance

C. both 1 and 2

D. amplifier

Answer: B

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45. On increasing reverse voltage in a $p - n$ junction diode the value of reverse current will

A. gradually increases

B. first remains constants and then suddenly increases

C. remains constant

D. gradually decrease

Answer: B

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46. In forward bias the depletion layer behaves like

A. an insulator

B. a conductor

C. a semiconductor

D. capacitor

Answer: B

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47. $p - n$ junction in reverse bias behaves like

A. an inductor

B. a condenser

C. amplifier

D. an off switch

Answer: D

Watch Video Solution

48. The main cause of avalence breakdown is

A. collision by ionisation

B. high doping

C. recombination of electrons and holes

D. low doping

Answer: A

Watch Video Solution

49. When $p-n$ junction is forward biased, the current across the junction is mainly due to

A. diffusion of charges

B. drifting of charges

C. both diffusion and drifting of charges

D. holes only

Answer: A

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50. The current through any $p-n$ junction is due to

(a) drift of charge carriers

(b) diffusion of charge carriers

(c) different concentrations of same type of charge carriers in different regions.

(d) Same concentrations of same type of charge carriers in different regions

A. a,b and c

B. a and b only

C. only d

D. a,b,c,d

Answer: A

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51. The thickness of depletion layer is approximately

A. $1\mu m$

B. 1 mm

C. 1 cm

D. 1 m

Answer: A

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52. The depletion region is

A. region of opposite charges q

B. neutral region

C. region of infinite energy

D. region of free currents carries

Answer: D

Watch Video Solution

53. Diffusion current in a p-n junction is greater than the drift current in magnitude

A. forward biased

B. reverse biased

C. un biased

D. both forward and reverse biased

Answer: A

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54. Diode is forward biased and the applied voltage is greater than the potential barrier then

(I) resistance of the junction in the forward bias decreases

(II) potential barrier remains same

(III) width barrier remains decreases

(IV) p-type is at higher potential than the n-type.

A. all are true

B. all are false

C. I,II,IV are true I

D. II,III are true

Answer: C

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55. When a junction diode is reverse biased, then current called drift current is due to

A. majority charge carries of both n&p sides

B. minority charge carries of both n&p sides

C. holes of both n & p sides

D. conduction band electrons of n-side only

Answer: B

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56. Among the following one statement is not correct when a junction diode is forward bias

A. the width of depletion region decrease

B. free electron on-n side will move toward the junction

C. holes on p-side move toward the junction

D. electron on n-side and holes on p-side will move away from junction .

Answer: D

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57. Consider the following statement A and B and identify the correct choice of the given answers

$A:$ The width of the depletion layer in a $P-N$ junction diode increases in forwards biase

$B:$ In an intrinsic semiconductor the fermi energy level is exactely in the middle of the forbidden gap

A. A is true and B is false

B. Both A and B are false

C. A is false and B is true

D. Both A and B are true

Answer: C

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58. The potential in the depletion layer due to.

A. Electrons

B. Holes

C. Ions

D. Forbidden band

Answer: C

Watch Video Solution

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

A. this current doubles for every $100^{\circ} C$ rise of temperature

B. this current is due to minority carries

C. the current carreis are produced by thermal agitation

D. reverse saturation current is also known as leakage current

Answer: A

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60. When the $p-n$ junction diode is reverse biased, the thickness of the depletion layer

A. increase

B. decrease

C. becomes zero

D. remains constant

Answer: A

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

A. amplifer

B. detector

C. oscillator

D. capacitor

Answer: B

Watch Video Solution

62. A $p-n$ junction diode is reverse biased. Then

A. more current flows

B. the barrier potential decreases

C. the barrier potential increases

D. resistance offered is low

Answer: C

Watch Video Solution

63. In the middle of the depletion layer of a reverse - biased $p-n$ junction , the

A. electric filed is zero

B. potential is maximum

C. electric field is maximum

D. potential is zero

Answer: C

Watch Video Solution

64. When $p-n$ junction diode is forward biased then

A. the depletion region is reduced and barrier height is increases

B. the depletion region is widened and barrier height is reduced

C. both the depletion region and barrier height is reduced

D. both the depletion region and barrier height is increased

Answer: C

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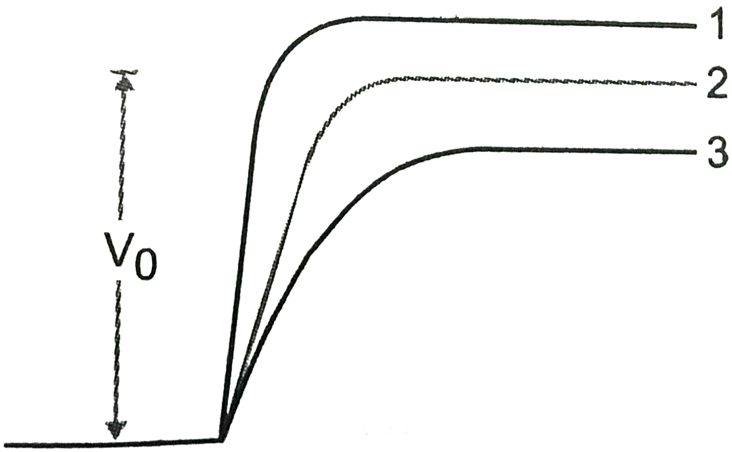
65. In Fig . V_0 is the potential barrier across a p-n junction, when no battery is connected across the junction



A. 1 and 3 both correspond to forward bias of junction

B. 3 corresponds to forward bias of junction and 1 correpsonds to reverse bias of junction

C. 1 corresponds to forward bias and 3 corresponds to reverse bias of junction

D. 3 and 1 both correspond to reverse bias

Answer: B

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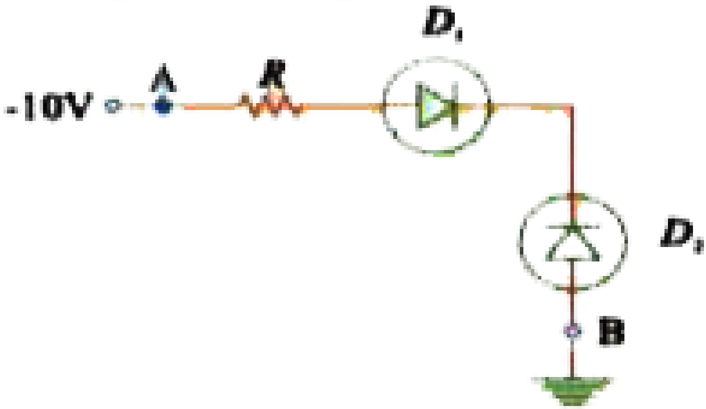
66. In Fig assuming the diodes to be ideal :



A. D_1 is forward biased and D_2 is reverse biased and hence current flow form A to B

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

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

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

Answer: B

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67. A Si and a Ge diode has identical physical dimensions. The band gap in Si is larger than that in Ge. An indentical reverse bias is applied across the diodes.

A. The reverse curret in Ge is larger than that in Si

B. The reverse curret in Si is larger than that in Ge

C. The reverse curret is identical in the two diodes

D. The relative magnitude of the reverse currents cannot be determined from the given data only

Answer: C

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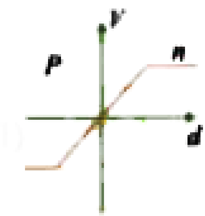
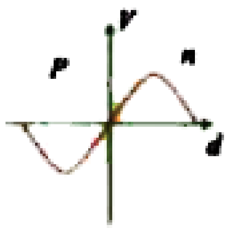
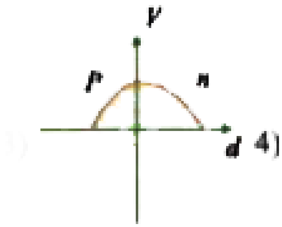
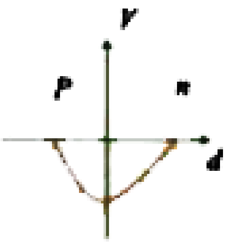
68. The correct curve between potential (V) and distance (d) near $p-n$ junction is.

A. 

B. 

C. 

D. 

Answer: A

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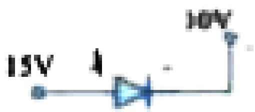
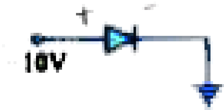
69. Which of the following is reverse biased diode?

A. 

B. 

C. 

D. 

Answer: C

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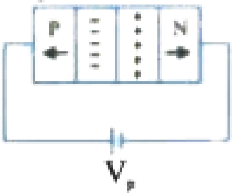
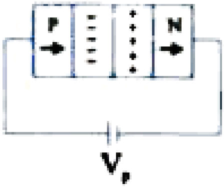
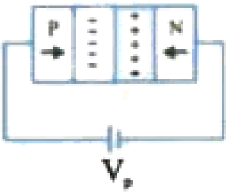
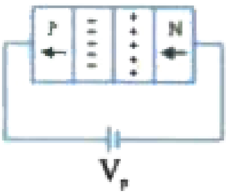
70. In the case of forward biasing of PN-junction, which one of the following figures correctly depicts the direction of flow of carriers?

A. 

B. 

C. 

D. 

Answer: C

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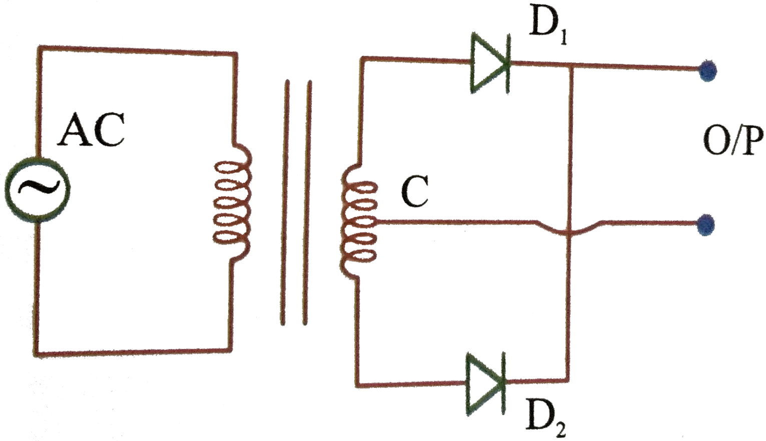
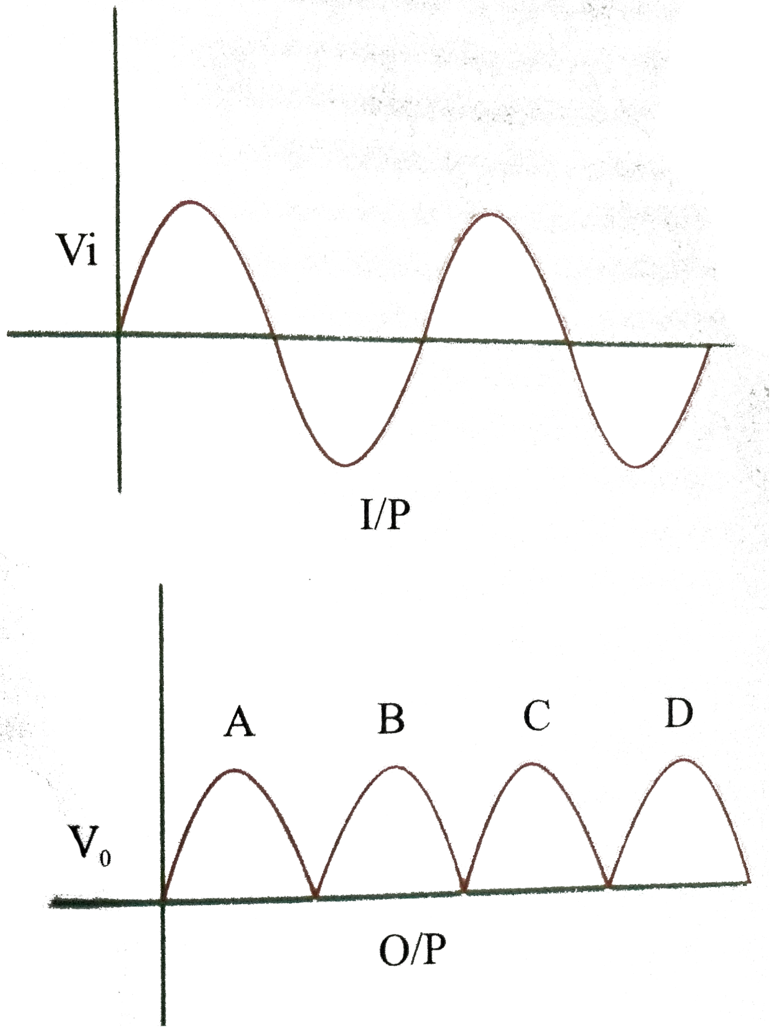
C U Q Application Of Junction Diode As Rectifier

1. A full wave rectifier with the output is shown in fig. the contributions from the diode (2) are.


D1
AC
O/P
C
D2



A. C

B. A,C

C. B,D

D. A,B,C,D

Answer: C

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2. A full-wave rectifier is used to convert 'n' Hz a.c into d.c, then the number of pulses per second present in the rectified voltage is.

A. n

B. $n/2$

C. $2n$

D. $4n$

Answer: C

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3. If the input frequency of half-wave rectifier is $nHzac$, then its output is

A. a constant dc

B. n/2 Hz pulsating dc

C. n Hz pulsating dc

D. 2n Hz pulsating dc

Answer: C

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4. Germanium diode.

A. may be unsed as rectifier becaue if offers a relatively low resistance for roward bias and very high resistance for reverse bias.

B. may be used as a rectifier, becaouse it offers a relaively high resistance for forward bias and very low resistance for reverse bias.

C. cannot be used as a rectifeir

D. may be used as an amplifier

Answer: A

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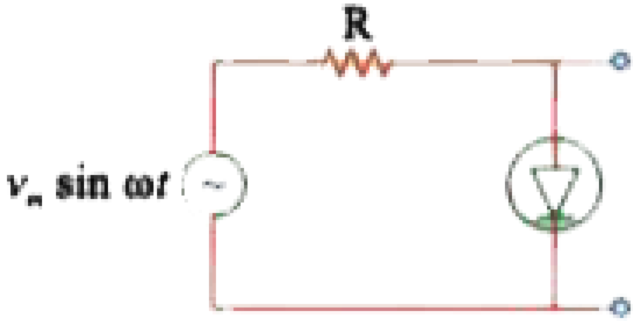
5. The output of the given circuit in Fig.



A. would be zero at all times

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

C. would be like a half-wave rectifer with negative cycles in output

D. would be like that of a full-wave rectifier.

Answer: C

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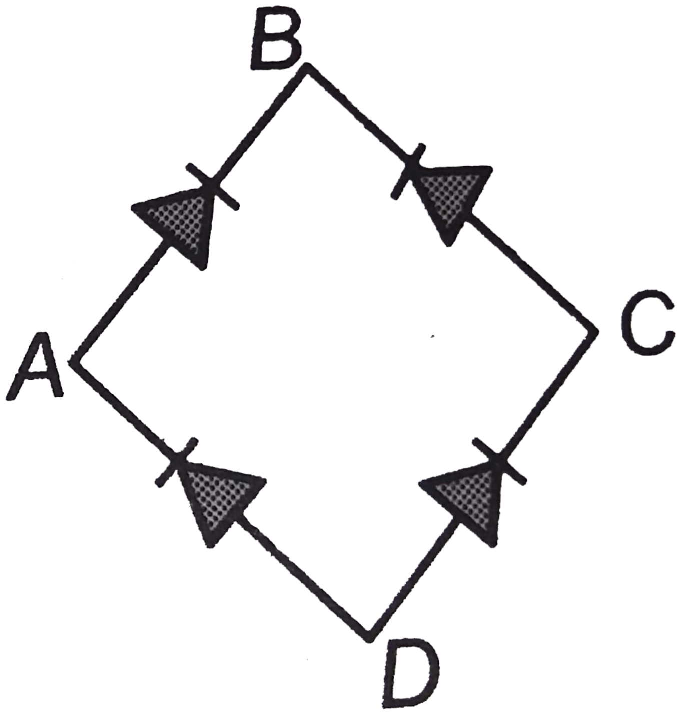
6. In the diagram, the input is across the terminals A and C and the output is across the terminals B and D, then the outputs is



A. Zero

B. Same as input

C. Full wave rectifier

D. Half wave rectifier

Answer: D

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7. To reduce the ripples in a rectifier circuit with capacitor filter.

(a) R_L should be increased

(b) Input frequency should be decreased

(c) Input frequency should be increased

(d) Capacitors with high capcitance should be used

A. Only a

B. Only a and b

C. a,b and d

D. a,c and d

Answer: B

View Text Solution

C U Q Special Purpose P N Junction Diodes

1. A Zener diode is based on the principle of

A. Thermionic emission

B. Tunneling of charge carries across the junction

C. Diffusion of charge carries across the junction .

D. None of the above

Answer: D

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2. Zener diodes are used as :

A. Reference voltate elements

B. Reference current elements

C. Reference resistance

D. None of the above

Answer: B

View Text Solution

3. Zener diodes are :

A. Specially diped p-n junctions

B. Normally doped p-n junctions

C. Lightly doped p-n junctions

D. None of the above

Answer: A

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4. Which of the following diodes is operated in reverse bias mode ?

A. p-n junction

B. Zener diode

C. tunnel

D. Schottky

Answer: A

View Text Solution

5. There is a sudden increase in current in zener diode is

A. Due to rupture of bonds

B. Resistance of deplection layer becomes less

C. Due to high doping

D. Due to less dopin

Answer: B

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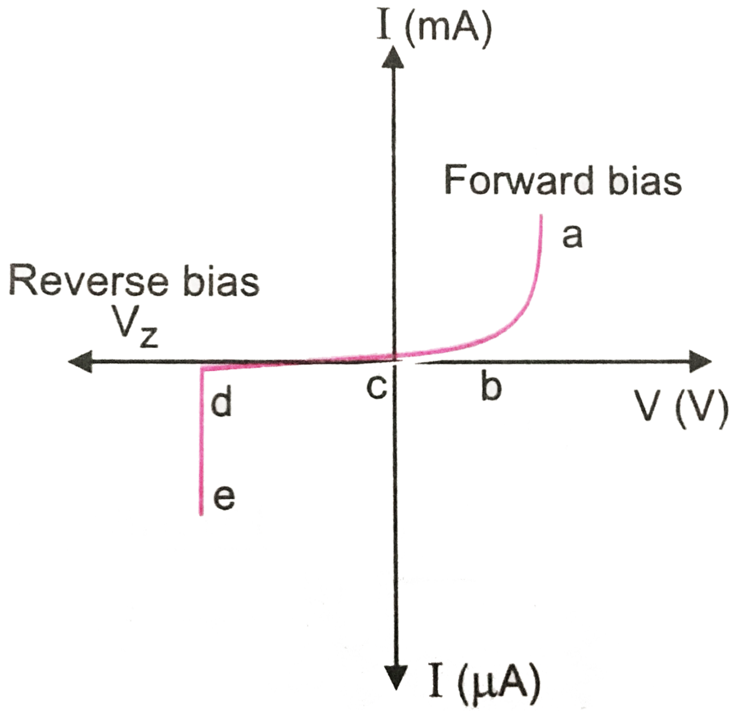
6. The graph shown in Fig. represents the I-V characteristics of a zener diode. Which part of the characteristics curve is most relevent for its operation as a voltage regular?



A. ab

B. bc

C. cd

D. de

Answer: D

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7. During regulation action of a Zener diode correct statement is :-

(a) the current and voltage across the Zener remains fixed.

(b) the current through the series resistance (RS) changes.

(c) the Zener resistance is constant.

(d) the resistance offered by the Zener diode changes.

A. a and c

B. a and d

C. b and c

D. b and d

Answer: D

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8. Consider the following statements A and B and identify the correct answer

(1) : Germanium is preferred over silicon in the construction of zener diode.

(2) : Germanium has high thermal stability than silicon in the construction of Zener diode.

A. Both 1 & 2 are true

B. Both 1 & are false

C. 1 is true but 2 is fals

D. 1 is false but 2 is true

Answer: B

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9. A Zener diode when used as a voltage regulator is connected

(a) in forward bias

(b) in reverse bias

(c) in parallel to the load

(d) in series to the load.

A. (a) and (b) are correct

B. (b) and (a) are correct

C. (a) only is correct

D. (d) only is correct

Answer: B

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10. Consider the following statements A and B and identify the correct answer

(A) A Zener diode is always connected in reverse bias to use it as voltage regulator.

(B) The potential barrier of a $p-n$ junction lies between 0.1 to $0.3V$, approximately.

A. A and B are correct

B. A and B are wrong

C. A is correct but B is worng

D. A is wrong but B is correct

Answer: C

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11. The main cause of Zener breakdown is.

A. the base semiconductor being germanium

B. production of electron -hole pairs due to thermal exitation

C. low doping

D. high doping

Answer: D

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12. The energy of radiation emitted by LED is :

A. Greater than the band gap of the semiconductor used.

B. Always less than the band gap of the semiconductor used.

C. Always eual o the band gap of the semiconductor used.

D. Equal to or less then the band gap of the semiconductor used

Answer: D

View Text Solution

13. Colour of light emitted by LED depends upon

A. Its forward bias

B. Its reverse bias

C. Forward current

D. Semiconductor material

Answer: D

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14. 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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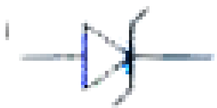
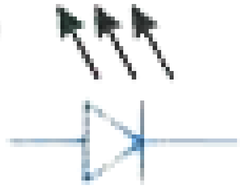
15. Symbolic representation of photodiode is

A. 

B. 

C. 

D. 

Answer: C

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16. The correct relation between current gains α and β is

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

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

C. $\beta = \alpha(1-\alpha)$

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

Answer: A

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17. Transistors are made of.

A. insulators

B. conductors

C. alloys

D. doped semi-conductors

Answer: D

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18. In $n-p-n$ transistor the arrow head on emitter represents that the convantional current flows from

A. base of emitter

B. emitter to base

C. emitter to collector

D. base of collector

Answer: A

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19. In a junction transistor the emitter, base and collector are made of.

A. extrinsic semi conducors

B. intrinsic semi conductors

C. both 1 and 2

D. 4 metal

Answer: A

Watch Video Solution

20. In a trannsistor

A. both emiiter and the collector are equally doped

B. base is more heavily doped than collector

C. colelctor is more heavily doped than the emitter

D. the base is made very him is lightly doped

Answer: D

View Text Solution

21. In a trannsistor

A. length of emitter is greater than that of collecor

B. length of collector is greater than that of emitter

C. both emitter and collector have same length

D. any one of emitter and collector can have greater length

Answer: B

View Text Solution

22. In transistor the emitter current is.

A. slightly more than the collector current

B. slightly less than the collector current

C. equal to the collector current

D. equal to the base current

Answer: A

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23. For a transistor amplifier, the voltage gain

A. remains constant for all frequencies.

B. is high at high and low frequencies and constnat in the middle frequency range.

C. Is low at high and low frequency and constant at mide frequencies.

D. None of the above

Answer: C

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24. In the use of transistor as an amplifier

A. the emitter -base junction is reverse biased and the collector base junction is also reverse biased

B. the emitter -base junction is forward biased and the collector- base juncton is reverse biased

C. both the junctions are forward biased

D. any of the two junctions may be forward biased.

Answer: B

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25. One way in which the operation of an npn transistor differ from that of a pnp transistor is that

A. the emitter junction is reverse biased in npn

B. the emiiter junction injects minority carries into the base region of the pnp.

C. the emmiter inject holes into the base of the pnp and electrons into the base region of npn

D. the emitter inject holes into the base of npn

Answer: C

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26. npn transistors are preferred to pnp transistors because they have

A. low cost

B. low dissipation energy

C. capable of handling large power

D. electrons have high mobility than holes and hence high mobility of energy

Answer: D

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27. A CE transistor amplifies weak current signal because collector current is.

A. β times I_0

B. β times I_C

C. α times I_b

D. α times I_{bC}

Answer: A

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28. When a positive voltage signal is applied to the base of a common emitter npn amplifier

A. The emitter current decrease

B. The collector voltage becomes more positive

C. The collector voltage becomes less positive

D. The collector currnet decreases

Answer: C

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29. In case of common emitter $p-n-p$ transistor input characteristic is a graph drawn.

A. With L_C on y-axis and V_{CE} on x-axis keeping I_B constant

B. With I_B on y-axis and V_{BE} on x-axis keeping V_C constant

C. With I_C on y-axis and I_B on x-axis keeping V_{CE} constant

D. With V_{BE} on y-axis and V_{CE} on x-axis keeping I_B constant

Answer: B

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30. The output characterstics of an $n-p-n$ transistor represent, [I_C = Collector current, V_{CE} = potential difference between collector and emitter, I_B = Base current, V_{BB} = voltage given base , V_{BE} = the potential difference between base and emitter].

A. change in I_C as I_B and V_{BB} are changed

B. Changes in I_C with changes in V_{CE}(I_B= constant)

C. Change in I_C as I_{BE} with changes in V_{CE}

D.

Answer: B

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31. In a transistor the base is made very thin and is lightly doped with an impurity, because.

A. to enable the collector to collect about 95% of the holes or electrons coming from the emitter side

B. to enable the emitter to emit small number of holes or electrons

C. to save transistors from high current effects

D. to enabale the base to collect about 95% of holes of electrons coming from the emitter side

Answer: A

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32. 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 reverse biased

Answer: C

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33. An $n-p-n$ transistor power amplifier in $C-E$ configuration gives.

A. Vopltage amplification only

B. Current amplification only

C. Both current and voltage amplification

D. Only power gain of unity

Answer: C

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34. When $n-p-n$ transistor is used as an amplifier :

A. electrons move from base to collector

B. holes moves from emitter to base

C. holes moves from collector to base

D. holes moves from base to emitter

Answer: A

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35. The part of a transistor which is heavily doped to produced large number of majority carries is

A. emitter

B. base

C. collector

D. can be any of the above three

Answer: A

Watch Video Solution

36. When $n-p-n$ transistor is used as an amplifier :

A. electrons move from collector to base

B. holes move from collector to base

C. electrons move from base to emitter

D. holes move from base to emitter

Answer: D

Watch Video Solution

37. A $n-p-n$ transistor conducts when

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

B. both collector is positive and are 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 respect to the base

Answer: B

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38. In a common-base amplifier, the phase difference between the input signal voltage and output voltage is :

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

B. π

C. zero

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

Answer: C

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39. In a common emitter amplifier , the phase difference between the input signal voltage and output voltage is

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

B. 0

C. π

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

Answer: C

Watch Video Solution

40. When $n-p-n$ transistor is used as an amplifier :

A. Electrons move from emitter to collector

B. Holes move from emitter to base

C. Eelectrons move form collector to base

D. Holes move from base to collector

Answer: A

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41. In a PNP transistor the base is the N-region. What is the width relative to the P-region is

A. smaller

B. larger

C. same

D. not related

Answer: A

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42. A three terminal device with one terminal common to both the output and input is called.

A. rectifier

B. transistor

C. diode

D. triode

Answer: B

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43. Input and output signal of an amplifier in CE configuration are always

A. Equal

B. Inphase

C. Having a phase difference

D. out of phase

Answer: D

Watch Video Solution

44. Transistor amplifier circuit with a feed back circuit is called

A. oscillator

B. deterctor

C. modulator

D. all

Answer: A

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45. A pulsating voltage is a mixture of an $a.c$ componet and $a.d.c$ compenent. The circuit used to separate $a.c$ and $d.c$ component is called

A. an osicllator

B. an amplifier

C. a rectifier

D. a filter

Answer: D

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46. The α and β of a transistor are always

A. $\alpha > , \beta < 2$

B. $\alpha g < , \beta > 2$

C. $\alpha = \beta$

D. $\alpha bea = 1$

Answer: B

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47. In case of NPN transistor, emitter current is always greater than collector current, because :

A. Collector side is revese biased and emitter side is forwared biased

B. Collector being reverse biased attrcts more electrons

C. Some electrons are lost in base

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

Answer: C

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48. When a transistor amplifier having current gain of 75 is given an input signal, $V_I = 2\sin(157t + \pi/2)$, the output signal is found to be $V_o = 200\sin(157t + 3\pi/2)$. The transistor is connected as :

A. A common colelctor amplifier

B. A common base amplifire

C. A common emitter amplifier

D. An oscillator

Answer: C

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49. An oscillator is an amplifier with

A. A large gain

B. Negative feedback

C. Positive feedback

D. No feedback

Answer: C

Watch Video Solution

50. In which of the transistor configurations, the voltage gain is highest ?

A. Common-base

B. Common-emitter

C. Common-collector

D. Samein all three

Answer: B

Watch Video Solution

51. A working transistor with its three legs marked P,Q, and Ris tested using a multimeter to Rand the other (positive) terminal to P or Q . Some resistance is seen on the muiltimeter. Which of the following is true for the transistor ?

A. It is pnp transistor with R as emitter

B. It is npn transistor with R as collector

C. It is npn transistor with R as base

D. It is pnp transistor with R as collector

Answer: C

View Text Solution

C U Q Logic Gates

1. In the Binary number system the number 100 represents :

A. one

B. three

C. four

D. hundred

Answer: C

Watch Video Solution

2. Among the following is not the function of NOT gate is

A. stop a signal

B. invert an input signal

C. complement a signal

D. change the logic in a digital circuit

Answer: A

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3. Digital circuit can be made by repetitive use of

A. OR gates

B. AND gates

C. NOT gates

D. NAND gates

Answer: D

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4. Among the following one gives output 1 in the AND gate

A. $A = 0, B = 0$

B. $A = 1, B = 1$

C. $A = 1, B = 0$

D. $A = 0, B = 1$

Answer: B

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5. When a PN juction diode is forwards biased, energy is released at the juction due to the recombination of electrons and holes. This energy is in

A. Visible region

B. Infrared region

C. UV region

D. X-ray region

Answer: B

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6. $NAND$ and NOR gates are called universal gates because they

A. are universally available

B. can be combined to produce OR, AND and NOT gas

C. are widely used in the Integrated circuits

D. can be easily manufactured.

Answer: B

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7. In positive logic, the logic state 1 corresponds to

A. positive voltage

B. zero voltage

C. lower voltage level

D. higher voltage level.

Answer: D

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8. In Boolean algebra $A + B = Y$ implies that :

A. sum of A and is Y

B. Y exists when A exists or both A and B exist

C. Y exists only when A and B exist

D. Y exists when A or B exists but not both A and B exist.

Answer: B

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9. In the Boolean algebra, the following one is wrong

A. $1 + 0 = 1$

B. $0 + 1 = 1$

C. $1 + 1 = 1$

D. $0 + 0 = 1$

Answer: D

Watch Video Solution

10. In Boolean algebra A.B =Y implies that :

A. product of A and B is Y

B. Y exists when A exists or B exists

C. Y exists when both A and B exist but not when only A or B exists

D. Y exists when A or B exists but not both A and B exist.

Answer: C

Watch Video Solution

11. In the Boolean algebra, the following one is wrong

A. $1.0 = 0$

B. $0.1 = 0$

C. $1.1 = 0$

D. $1.1 = 1$

Answer: C

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12. The following truth table is for

$$\begin{array}{ccc} A & B & Y \\ 1 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{array}.$$

A. NAND gate

B. AND gate

C. XOR gate

D. NOT gate

Answer: A

Watch Video Solution

13. The output of a 2-input OR gate is zero only when its

A. both inputs are 0

B. either input is 1

C. both inputs are 1

D. either input is zero

Answer: A

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14. Boolean algebra is essentially based on

A. symbols

B. logic

C. truth

D. numbers

Answer: B

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15. The value of $\overline{A} + A$ in the Boolean algebra is

A. A

B. $\overline{A}$

C. 0

D. 1

Answer: D

Watch Video Solution

16. The value of $A.\,\overline{A}$ in Boolean algebra is.

A. 0

B. 1

C. A

D. $\overline{A}$

Answer: A

Watch Video Solution

17. The following is NOT equal to 0 in the Boolean algebra is

A. $\overline{\overline{A}\,.\,O}$

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

C. $A.0$

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

Answer: A

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18. An AND gate is following by a NOT gate in series. With two inputs A & B, the Boolean expression for the out put Y will be :

A. $A.\,B$

B. $A+B$

C. $\overline{A+B}$

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

Answer: D

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19. NOR gate is the series combination of

A. NOT gate followed by OR gate

B. OR gate followed by NOT gate

C. AND gate followed by OR gate

D. OR gate followed by AND gate

Answer: B

Watch Video Solution

20. The gate that has only one input terminal

A. NOT

B. NOR

C. NAND

D. XOR

Answer: A

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21. AND gate :

A. It has no equivalenc to switching circuit.

B. It is equivalent to series switching circuit.

C. It is equivalent to paralle switching circuit.

D. It is a mixture of series and paralle switching circuit.

Answer: B

View Text Solution

Exercise 1 C W Intrinsic And Extrinsic Semiconductors

1. The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than $2480nm$ is incident on it. The band gap in (eV) for the semiconductor is.

A. $0.7eV$

B. $0.5eV$

C. $2.5eV$

D. $1.2eV$

Answer: B

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2. Pure Si at 300 K has equal electron (n_e) and hole (n_h) concentrations of $1.5 \times 10^{16} m^{-3}$ doping by indium increases n_h to $4.5 \times 10^{22} m^{-3}$. Caculate n_e in the doped Si-

A. 5×10^9

B. 7×10^9

C. 9×10^9

D. 8×10^9

Answer: A

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3. A P-type semiconductor has acceptor levels $57meV$ above the valence band. The maximum wavelength of light required to create a hole is (Planck's constant $h = 6.6 \times 10^{-34} J - s$)

A. $57Å$

B. $57 \times 10^{-3}Å$

C. $217100Å$

D. $11.61 \times 10^{-33}Å$

Answer: C

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4. The electron mobility in N-type germanium is $3900 cm^2 / v - s$ and its conductivity is $6.24 mho / cm$, then impurity concentration will be if the effect of cotters is negligible

A. $10^{15} cm^3$

B. $10^{13} cm^3$

C. $10^{12} / cm^3$

D. $10^{16} / cm^3$

Answer: D

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Exercise 1 C W Junction Diode

1. In a $p-n$ junction the depletion region is $400nm$ wide and electric field of $5\times10^5Vm^{-1}$ exists in it. The minimum energy of a conduction electron, which can diffuse from n-side to the p-side is.

A. 4eV

B. 5eV

C. $0.4eV$

D. $0.2eV$

Answer: D

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2. The reverse bias in a junction diode is changed from $5V$ to $15V$ then the value of current changes from $38\mu A$ to $88\mu A$.

The resistance of junction diode will be.

A. $4x10^5\Omega$

B. $3x10^5\Omega$

C. $2x10^5\Omega$

D. $10^6\Omega$

Answer: C

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3. A diode made of silicon has a barrier potential of $0.7V$ and a current of $20mA$ passes through the diode when a battery of $emf\ 3V$ and a resistor is connected to it. The wattage of the resistor and diode are

A. $0.46W, 0.01W$

B. $4.6W, 0.14W$

C. $0.46W, 0.14W$

D. $46W, 14W$

Answer: A

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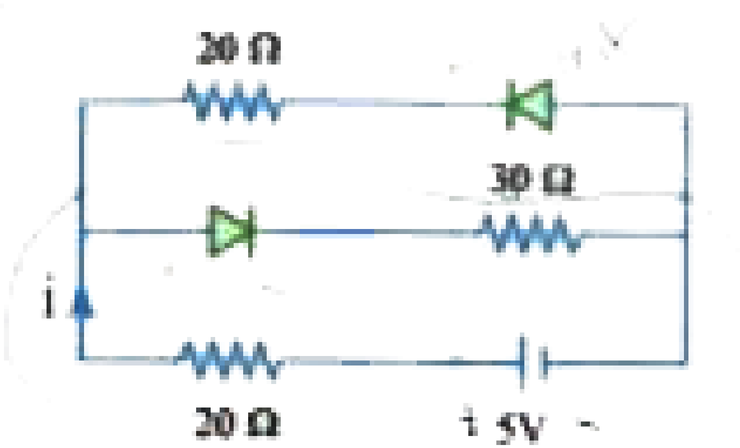
4. Current in the circuit will be



A. $\frac{5}{40}A$

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

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

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

Answer: B

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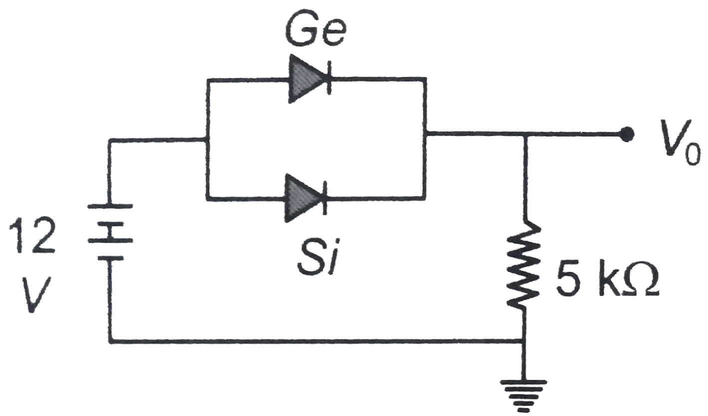
5. Ge and Si diodes conduct at $0.3V$ and $0.7V$ respectively. In the following figure if Ge diode connection are reversed, the value of V_0 changes by



A. $0.2V$

B. $0.4V$

C. $0.6V$

D. $0.8V$

Answer: B

Watch Video Solution

Exercise 1 C W Application Of Junction Diode As Rectifier

1. In a half wave rectifier output is taken across a $90 ohm$ load resistor. If the resistance of diode in forward biased condition is $10 ohm$, the efficiency of rectification of ac power into dc power is.

A. $40.6\ \%$

B. $81.2\ \%$

C. $73.08\ \%$

D. $36.54\ \%$

Answer: D

Watch Video Solution

2. In a full wave rectifier output is taken across a load resistor of $800 ohm$. If the resistance of diode in forward biased condition is $200 ohm$, the efficiency of rectification of ac power into dc power is.

A. $64.96\ \%$

B. $40.6\ \%$

C. $81.2\ \%$

D. $80\ \%$

Answer: A

Watch Video Solution

Exercise 1 C W Transistors

1. In a $P-N-P$ transistor, the collector current is $10mA$. If 90% of the holes reach the collector, then emitter current will be :

A. 13 mA

B. 12 mA

C. 11 mA

D. 10 mA

Answer: C

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2. A transistor has a base current of $1mA$ and emitter current $100mA$. The current transfer ratio will be

A. 0.9

B. 0.99

C. 1.1

D. 10.1

Answer: B

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3. When base -emitter voltage of a transistor connected in the common-emitter mode is changed by $20mV$ the collector current is changed by $25mA$. Find the transconductance.

A. $1.25\Omega^{-1}$

B. $2.5\Omega^{-1}$

C. $0.5\Omega^{-1}$

D. $5.5\Omega^{-1}$

Answer: A

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4. In a transistor circuit the base current changes from $30\mu A$ to $90\mu A$. If the current gain of the transistor is 30, the change in the collector current is.

A. 4mA

B. 2 mA

C. $3.6mA$

D. $1.8mA$

Answer: D

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5. The circuit gain of transistor in a common emitter circuit is 40. The ratio of emitter current to base current is.

A. 40

B. 41

C. 42

D. 43

Answer: B

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6. In a common base configuration the emitter current changes by $5mA$ when emitter voltage is changed by $200mV$ at a fixed collector to base voltage. The input resistance is.

A. 40Ω

B. 1000Ω

C. 2.5Ω

D. 4Ω

Answer: A

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7. For a common base amplifier, the values of resistance gain and voltage gain are 3000 and 2800 respectively. The current gain will be

A. 0.93

B. 0.83

C. 0.73

D. 0.63

Answer: A

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8. In a transistor amplifier $\beta = 62$, $R_L = 5000\Omega$ and internal resistance of the transistor is 500Ω. Its power amplification will be.

A. 25580

B. 33760

C. 38440

D. 55280

Answer: C

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Exercise 1 C W Logic Gates

1. Decimal number 15 is equivalent to the binary number :

A. 11001

B. 101

C. 101101

D. 001111

Answer: D

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2. Binary number 1001001 is equivalent to the decimal number :

A. 37

B. 73

C. 41

D. 32

Answer: B

Watch Video Solution

3. In the Binary number system $1 + 1 =$

A. 2

B. 1

C. 10

D. 100

Answer: C

Watch Video Solution

4. If $A = B = 1$, then in terms of Boolean algebra the value of $A. B + A$ is not equal to.

A. $B. A + B$

B. $B + A$

C. B

D. $\overline{A} . B$

Answer: D

Watch Video Solution

5. In the Boolean algebra, the following one is wrong

A. A.A

B. A+A

C. $\overline{A} . A$

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

Answer: C

Watch Video Solution

6. The logic expression which is NOT true in Boolean algebra is.

A. $[\bar{1}+\bar{1}].1=0$

B. $[\bar{1}+0].1=0$

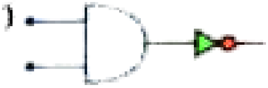
C. $[\bar{1}+0]\bar{1}. \; =0$

D. $[1+1]=.1=0$

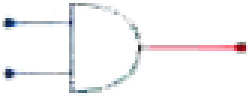
Answer: D

Watch Video Solution

7. Which of these represents $NAND$ gate?

A. 

B. 

C. 

D. 

Answer: A

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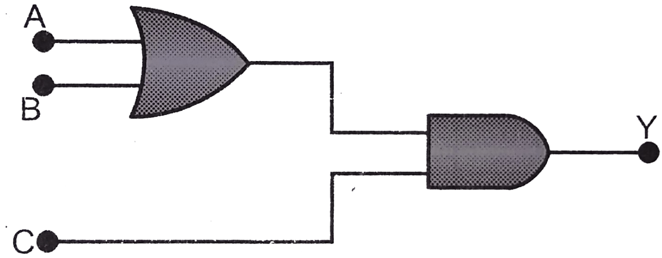
8. In order to obtain an output $Y = 1$ form the circuit of fig. the inputs must be



A. $\begin{matrix} A & B & C \\ 0 & 1 & 0 \end{matrix}$

B. $\begin{matrix} A & B & C \\ 1 & 0 & 0 \end{matrix}$

C. $\begin{matrix} A & B & C \\ 1 & 0 & 0 \end{matrix}$

D. $\begin{matrix} A & B & C \\ 1 & 1 & 0 \end{matrix}$

Answer: C

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9. How many $NAND$ gate are used to from AND gate?

A. 1

B. 2

C. 3

D. 4

Answer: B

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Exercise 1 H W Intrinsic And Extrinsic Semiconductors

1. The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than $1240 nm$ is incident on it. The forbidden band energy for the semi conductor is (in eV).

A. 0.5

B. 0.97

C. 0.7

D. 1.1

Answer: B

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2. A semiconductor is known to have an electron concentration of $5 \times 10^{13} / cm^3$ and hole concentration of $8 \times 10^{12} / cm^3$. The semiconductor is

A. n-type

B. p-type

C. intrinsic

D. insulator

Answer: A

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Exercise 1 H W Junction Diode

1. A potential barrier of $0.5V$ exists across a p-n junction . If the widht of depletion layer is 10^{-6}m, then intensity of electric field in this region will be

A. $1 \times 10^6 V/m$

B. $5x10^5 V/m$

C. $4x10^4 V/m$

D. $2x10^6 V/m$

Answer: B

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2. A $p-n$ junction diode has breakdown voltage of $28V$. If applied external in reverse bias is $40V$ the current through it is

A. Zero

B. infinite

C. $10A$

D. 15 A

Answer: B

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3. The value of current in the following diarams is (diode asued to be ideal one)

A. 0.1 amp

B. 0.01 amp

C. 1 amp

D. zero

Answer: D

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4. When a silicon PN junction is in forwards biased condition with series resistance, it has knee voltage of $0.6V$. Current flow in it is $5mA$, when PN junction is connected with $2.6V$ battery, the value of series resistance is

A. 100Ω

B. 200Ω

C. 400Ω

D. 500Ω

Answer: C

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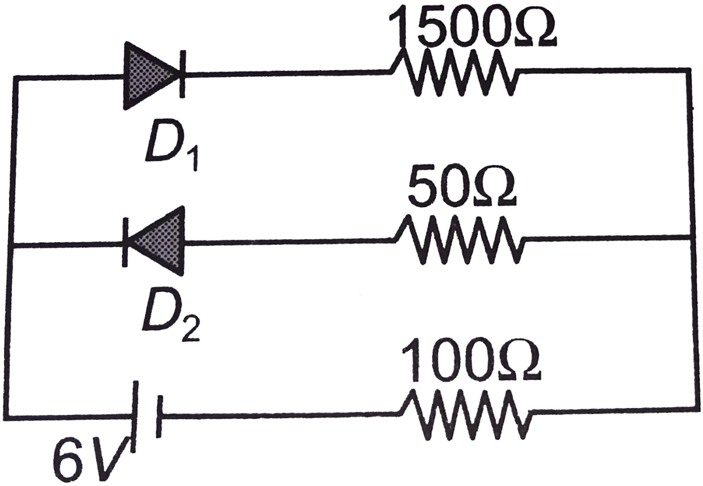
5. The circuit shown in following figure contanis two diode D_1 and D_2 each with a forward resistance of $50ohm$ and with infinite backward resistance. If the battery voltage is $6V$, the current through the 100 ohm resistance (in amperes) is



A. Zero

B. 0.02

C. 0.03

D. 0.036

Answer: A

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1. A half-wave rectifier is used to convert $50HzA.C.$ to $D.C$ voltage. The number of pulses per second in the rectified voltage are

A. 50

B. 25

C. 100

D. 75

Answer: A

Watch Video Solution

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

A. 25 Hz

B. 50 Hz

C. 70.7 Hz

D. 100 Hz

Answer: D

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3. The peak voltage in the output of a half-wave diode rectifier fed with a sinusiodal signal without filter is $10V$. The dc component of the output voltage is

A. $\dfrac{10}{\sqrt{2}}V$

B. $10/\pi V$

C. $10V$

D. $20/\pi V$

Answer: B

Watch Video Solution

Exercise 1 H W Transistors

1. In an npn transistor the base the collector currents are $100\mu A$ and $9mA$ respectively. Then the emitter current will be

A. $9.1mA$

B. $18.2mA$

C. $3.9\mu A$

D. $18.2\mu A$

Answer: A

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2. A change of $8mA$ in the emitter current brings a change if $7.9mA$ in the collector current. The change in base current required to have the same change in the collector is

A. $0.01mA$

B. 1A

C. $10mA$

D. $0.1 mA$

Answer: D

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3. For a $p-n-p$ transistor in CB configuration, the emitter current I_E is $1 mA$ and $\alpha = 0.95$. The base current and collector current are

A. $0.95 mA, 0.05 mA$

B. $0.05 mA, 0.95 mA$

C. $9.5 mA, 0.5 mA$

D. $0.5 mA, 9.5 mA$

Answer: B

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4. If a change of $100\mu A$ in the base current of an $n-p-n$ transistor in CE causes a change of $10mA$ in the collector current, the ac current gain of the transistor is

A. 10

B. 100

C. 1000

D. 10000

Answer: B

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5. For a common emitter amplifier, current gain is 70. If the emitter current is $8.4mA$, then the base current is

A. $0.23mA$

B. $0.118mA$

C. $0.59mA$

D. $8.3mA$

Answer: B

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6. The base current of a transistor is $105\mu A$ and the collector current is $2.05mA$. Then β of the transistor is

A. 1.952

B. 19.52

C. 195.2

D. 1952

Answer: B

Watch Video Solution

7. For a transistor the value of α is 0.9. β value is

A. 9

B. 0.9

C. 0.09

D. 90

Answer: A

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8. For a transistor the current amplification factor is 0.8 The transistor is connected in common emitter configuration, the change in collector current when the base current changes by $6mA$ is

A. 6 mA

B. $4.8mA$

C. $24mA$

D. $8mA$

Answer: C

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9. A change of $400 mV$ in base-emitter voltage causes a change of $200 \mu A$ in the base current. The input resistance of the transistor is

A. $1 K\Omega$

B. $6 K\Omega$

C. $2 K\Omega$

D. $8 K\Omega$

Answer: C

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10. In a common base circuit, if the collector base voltage is changed by $0.6 V$, collector current changes by $0.02 mA$. The output resistance will be

A. $10^4 \Omega$

B. $2x10^4 \Omega$

C. $3x10^4 \Omega$

D. $4x10^4 \Omega$

Answer: C

Watch Video Solution

11. A common emitter transistor amplifier has a current gain of 50. If the load resistance is $4k\Omega$, and input resistance is 500Ω, the voltage gain of amplifier is.

A. 100

B. 200

C. 300

D. 400

Answer: D

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Exercise 1 H W Logic Gates

1. Equivalent of decimal number 8 in the binary number is

A. 10

B. 101

C. 1000

D. 1011

Answer: C

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2. The equivalent of 110 in the decimal number is

A. 2

B. 4

C. 8

D. 6

Answer: D

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3. If $A=1, B=0$ then the value of $\overline{A}+B$ in terms of Boolean algebra is

A. A

B. B

C. $B+A$

D. $A.\overline{B}$

Answer: B

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4. In the Boolean algebra : $A+B=$

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

B. A.B

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

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

Answer: C

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5. The following one represents logic addition is

A. $1 + 1 = 2$

B. $1 + 1 = 10$

C. $1 + 1 + \ = 1$

D. $1 + 1 = 11$

Answer: C

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

A. $\overline{A + B}$

B. $A . B$

C. very close

D. $A + B$

Answer: A

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7. In the Boolean algebra, which gate is expressed as $Y = \overline{A + B}$.

A. OR

B. NAND

C. AND

D. NOR

Answer: D

Watch Video Solution

8. The truth table for NOT gate is.

A. $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$

Answer: C

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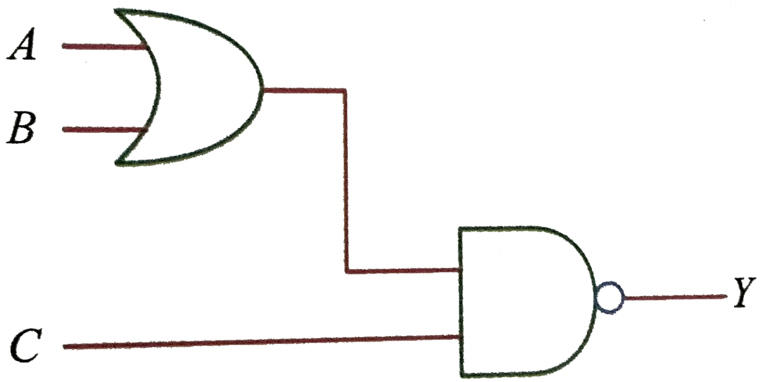
9. For the given combination of gates, if the logic states of inputs A, B, C are as follows $A = B = C = 0$ and $A = B = 1, C = 0$ then the logic states of output Y are



A. 0,0

B. 0,1

C. 0,1

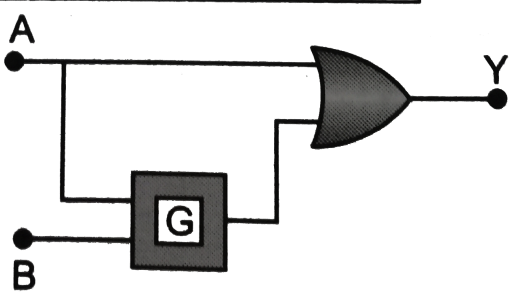
D. 1,1

Answer: D

Watch Video Solution

10. Identify the logic gate G in the combination of gates shown in fig. The truth table is shown here

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



A. OR gates

B. AND gate

C. NOT gate

D. NOR gate

Answer: B

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11. The following truth table corresponds to the logic gate

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

A. NAND

B. OR

C. AND

D. XOR

Answer: B

Watch Video Solution

Exercise 2 C W Intrinsic Extrinsic Semiconductons

1. A Ge specimen is dopped with Al. The concentration of acceptor atoms is ~$10^{21} atoms/m^3$. Given that the intrinsic concentration of electron hole pairs is ~$10^{19}/m^3$, the concentration of electron in the speciman is

A. $10^{17}/ms^3$

B. $10^{15} / m^3$

C. $10^4 / m^3$

D. $10^2 / m^3$

Answer: A

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2. The following data are for intrinsic germanium at $300K.\ n_i = 2.4 \times 10^{19} / m^3, \mu_e = 0.39 m^2 / Vs, \mu_h = 0.19 m^2 / Vs$. Calculate the coductivity of intrinsic germanium.

A. $4.3 Sm^{-1}$

B. $1.21 Sm^{-1}$

C. $2.22 Sm^{-1}$

D. $4.22 Sm^{-1}$

Answer: C

Watch Video Solution

Exercise 2 C W Junction Diodes

1. A $P-N$ junction diode can withstand currents up to $10 mA$. Under forward bias, The diode has a potential drop of $0.5V$ across it which is assumed to be independent of current. The maximum voltage of the battery used to forward bias the diode when a resistance of 200Ω is connected in series with it is

A. $2.5V$

B. $2.6V$

C. $2.7V$

D. $2.8V$

Answer: A

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2. A cell of emf. $4.5V$ is connected to a junction diode whose barrier potential is $0.7V$. If the external resistance in the circuit is 190Ω. The current in the circuit is

A. 20 mA

B. 2mA

C. 23 mA

D. 200 mA

Answer: A

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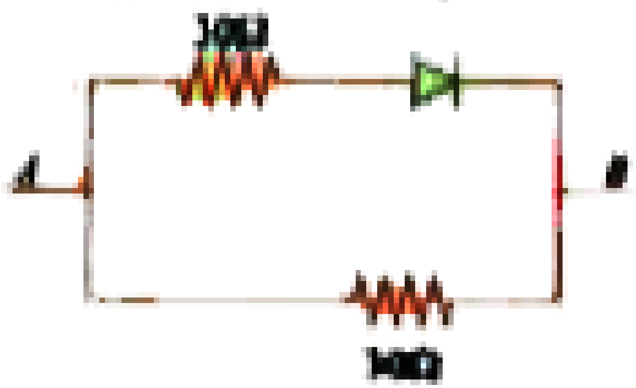
3. V_A and V_B denot potentils of A and B then the equivalent resistance of A and B, then the equivalent resistance between A and B in the adjoining circuit is (ideal diode)



A. $15\Omega \text{if} V_A > V_B$

B. $30\Omega \text{if} V_A < V_B$

C. both 1 and 2

D. neither 1 nor 2

Answer: C

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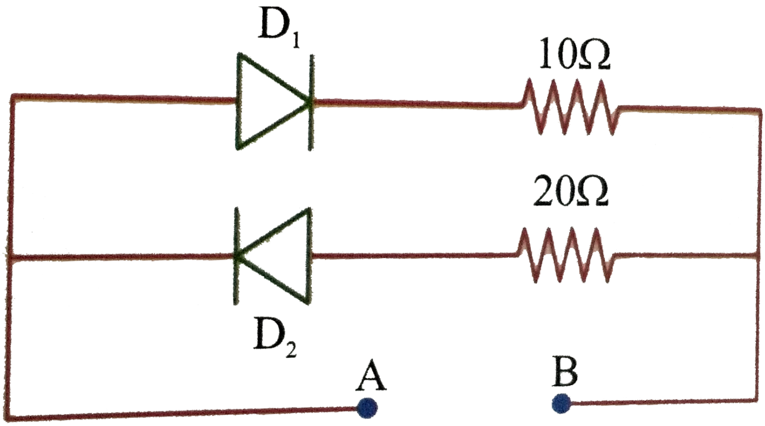
4. Two ideal junction diodes D_1, D_2 are connected as shown in the figure. A $3V$ battery is connected between A and B. The current supplied by the battery if its positive terminal is connected to A is



A. $0.1A$

B. $0.3A$

C. $0.9A$

D. 90A

Answer: B

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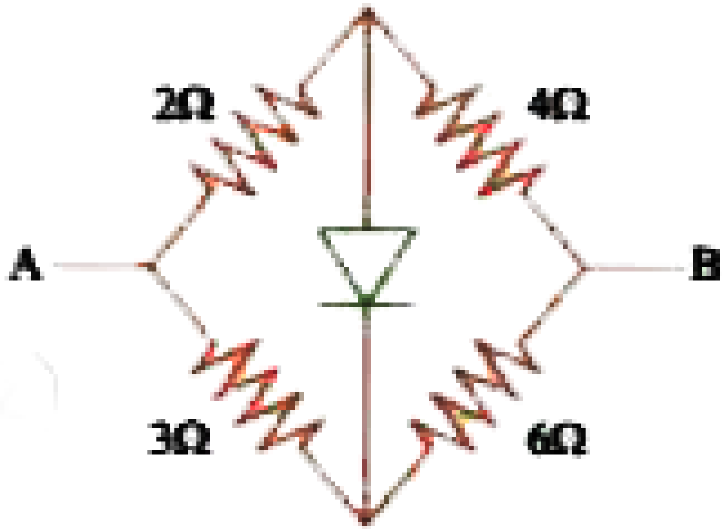
5. Find the effective resistance between A and B



A. $5/8\Omega$

B. $9/5\Omega$

C. $18/5\Omega$

D. $5/9\Omega$

Answer: C

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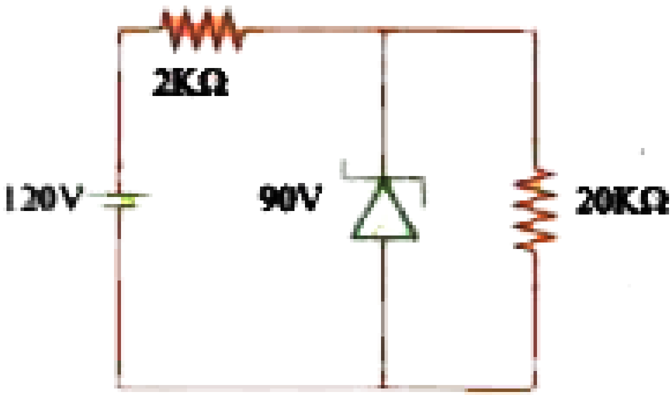
6. In the figure shown the potential drop across the series resistor is



A. 30 V

B. 60 V

C. 90 V

D. 120 V

Answer: A

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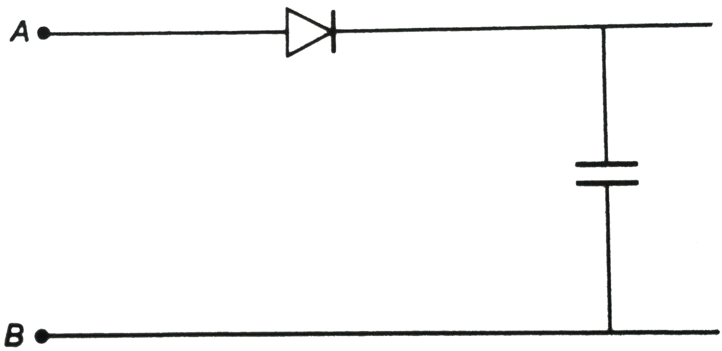
7. A 220 V AC supply is connected between points A and B . What will be the potential difference V across the capacitor ?



A. 220V

B. 110 V

C. 0V

D. $220\sqrt{2}V$

Answer: D

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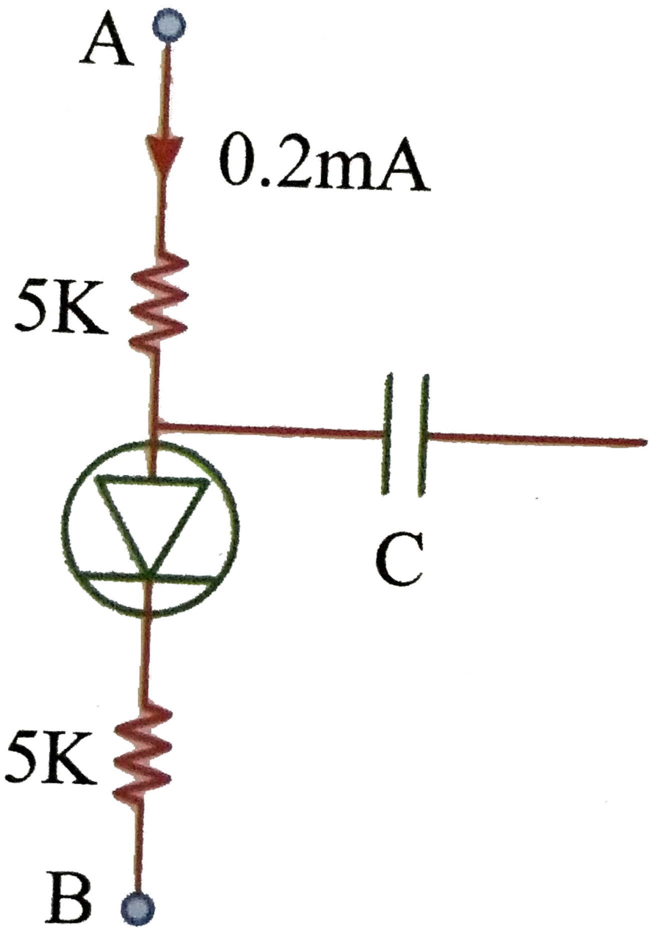
8. In the circuit shown(Fig.) if the diode forward voltage drop is $0.3V$, the voltage difference between A and B is :



A. $1.3V$

B. $2.3V$

C. 0

D. $0.5V$

Answer: B

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Exercise 2 C W Applications Of Junction Diode As Rectifier

1. The peak voltage in the output of a half-wave diode rectifier fed with a sinusiodal signal without filter is $10V$. The dc component of the output voltage is

A. $10/\sqrt{2}V$

B. $10/\pi V$

C. $10V$

D. $20/\pi V$

Answer: B

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Exercise 2 C W Transistors

1. In an n-p-n transistor 10^{10} electrons enter the emitter in 10^{-6}s. If 2% of the electrons are lost in the base, find the current transfer ratio and the current amplification factor.

A. $0.98, 49$

B. $0.49, 49$

C. $0.98, 98$

D. $0.49, 98$

Answer: A

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2. In a common base mode of transistor, collector current is $5.488mA$ for an emitter current of $5.60mA$. The value of the base current amplification factor (β) will be :

A. 48

B. 19

C. 50

D. 51

Answer: B

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3. Current amplification factor of a common base configuration is 0.88. Find the value of base current when the emitter current is $1mA$.

A. $0.12mA$

B. $0.1mA$

C. $0.5mA$

D. $1.2mA$

Answer: A

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4. For a transistor $\beta = 40$ and $I_B = 25 \mu A$. Find the value of I_E

.

A. 1 mA

B. $1.025 mA$

C. 2 mA

D. $1.2 mA$

Answer: B

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5. In a transistor if $\frac{I_C}{I_E} = \alpha$ and $\frac{I_C}{I_B} = \beta$,If α varies between $\frac{20}{21}$ and $\frac{100}{101}$, then the value of β lied between.

A. $1 - 10$

B. $0.95.0.99$

C. $20 - 100$

D. $200 - 300$

Answer: C

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6. For a transistor $x = \frac{1}{\alpha} \& y = \frac{1}{\beta}$ where $\alpha \& \beta$ are current gains in common base and common emitter configuration. Then

A. $x + y = 1$

B. $x - y = 1$

C. $2x = 1 - y$

D. $x + y = 0$

Answer: B

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7. A voltage amplifier operated from a 12 volt battery has a collector load $6k\Omega$. Calculate the maximum collector current in the circuit.

A. $0.5mA$

B. 1 mA

C. 3 mA

D. 2 mA

Answer: D

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8. A CE amplifier is designed with a transistor having $\alpha = 0.99$. Input impedance is $1k\Omega$ and load is $10k\Omega$. Voltage gain will be :

A. 9900

B. 99000

C. 99

D. 990

Answer: D

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9. In a common emitter amplifier the load resistance of the output circuit is 792 times the resistance of the input circuit. If $\alpha = 0.99$. The voltage gain is.

A. 79200

B. 39600

C. 7920

D. 3960

Answer: A

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10. In a transistor amplifier $\beta = 62, R_L = 5000\Omega$ and internal resistance of the transistor is 500Ω. Its power amplification will be.

A. 255980

B. 33760

C. 38440

D. 55760

Answer: C

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11. The tuned collector oscillator circuit used in the local oscillator of a ratio receiver makes use of a tuned circuit with $L = 60\mu H$ and $C = 400pE$. Calculate the frequency of oscillations.

A. 1.03 KHz

B. $1.03Hz$

C. 0.03 GHz

D. 1.03 MHz

Answer: D

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Exercise 2 C W Logic Gates

1. When we add binary number 111 and 111 we get the binary number :

A. 222

B. 1000

C. 1110

D. 000

Answer: C

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2. If

$A = B = C = 1$ and $X = \overline{ABC} + B\overline{CA} + B\overline{CA} + C\overline{AB}$,

then X=

A. 0

B. 1

C. 100

D. 110

Answer: A

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3. What will be the input of A and B for the Boolean expression $\overline{(A+B)}.\overline{(A.B)}=1$?

A. 0,0

B. 0,1

C. 1,0

D. 1,1

Answer: A

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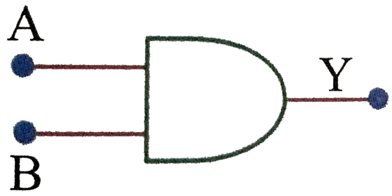
4. Consider a two-input AND gate of figure below. Out of the four entries for the Truth Table given here, the correct ones are.



	Input		Output
	A	B	Y
1	0	1	0
2	1	0	0
3	1	1	1
4	0	0	1

A. all are true

B. 1 and 2 only

C. 1, 2 and 3 only

D. 1,3 and 2 only

Answer: C

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5. A Truth table is given below. The below. The logic gate having following truth table is.

$$\begin{array}{ccc} A & B & Y \\ 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{array}.$$

A. NAND gate

B. NOR gate

C. AND gate

D. OR gate

Answer: B

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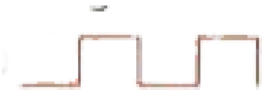
6. For a logic 0101 the waveform is.

A. 

B. 

C. 

D. 

Answer: A

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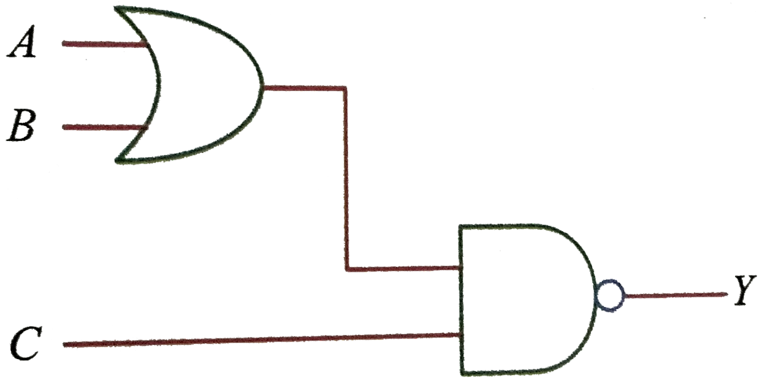
7. For the given combination of gates, if the logic states of inputs A, B, C are as follows $A = B = C = 0$ and

$A = B = 1, C = 0$ then the logic states of output Y are



A. 0,0

B. 0,1

C. 1,0

D. 1,1

Answer: D

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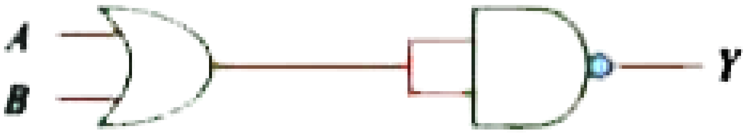
8. Identify the gate represented by the block diagram as shown in fig.



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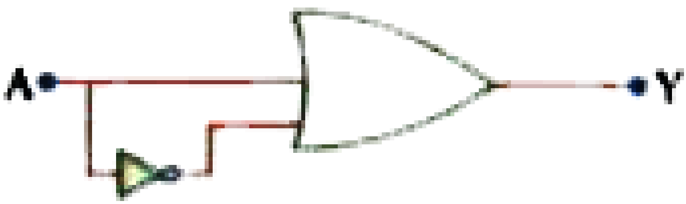
9. The Boolean expression for the gate circuit shown below is



A. $A+\overline{A}=1$

B. $A+1=1$

C. $A+A=A$

D. $A + 0 = A$

Answer: A

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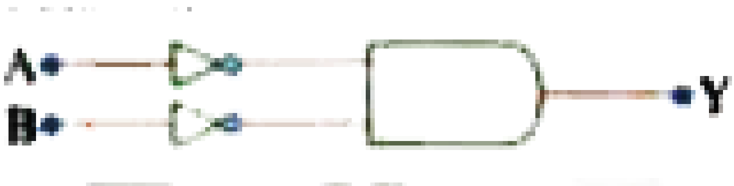
10. The output Y of the gate circuit shown in the figure below is



A. $\overline{A. B}$

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

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

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

Answer: B

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Exercise 2 H W Intrinsic Extrinsic Semiconductors

1. If the ratio of the concentration of electron to that of holes in a semiconductor is $\frac{7}{5}$ and the ratio of current is $\frac{7}{4}$ then what is the ratio of their drift velocities ?

A. $5/8$

B. $4/5$

C. $5/4$

D. $4/7$

Answer: C

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2. If the resistivity of copper is $1.7 \times 10^{-6} \Omega cm$, then the mobility of electrons in copper, if each atom of copper contributes one free electron for conduction, is [The amomic weight of copper is 63.54 and its density is $8.96 g / cc]$:

A. $23.36 cm^2 / V s$

B. $50.3.03 cm^2 / V s$

C. $43.25 cm^2 / V s$

D. $88.0 cm^2 / V s$

Answer: C

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3. A pure silicon crystal of length $l(0.1m)$ and area $A(10^{-4}m^2)$ has the mobility of electron (μ_e) and holes (μ_h) as $0.135m^2/Vs$ and $0.48m^2/Vs$, respectively, If the voltage applied across it is $2V$ and the intrinsic charge concen-tration it is $2V$ and the intrinsic charge concen-tration is $n_i = 1.5 \times 10^6 m^{-3}$, then the total current flowing through the crystal is.

A. $8.78 \times 10^{-17} A$

B. $6.25 \times 10^{-17} A$

C. $7.89 \times 10^{-17} A$

D. $2.456 \times 10^{-17} A$

Answer: A

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4. Find the current produced at room temperature in a pure germanium plate of area $2 \times 10^{-4} m^2$ and of thickness $1.2 \times 10^{-3} m$ when a potential of $5V$ is applied across the faces. Concentration of carries in germanium at room temperature is 1.6×10^6 per cubic metre. The mobilities of electrons and holes are $0.4 m^2 V^{-1} s^{-1}$ and $0.2 m^2 V^{-1} s^{-1}$ respectively. The heat energy generated in the plate in 100 second is.

A. $2.4 \times 10^{-11} J$

B. $3.4 \times 10^{-11} J$

C. $5.4 \times 10^{-11} J$

D. $6.4 \times 10^{-11} J$

Answer: D

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5. An n-type semiconductor has impurity level $20meV$ below the conduction band. In a thermal collision, transferble enegry is KT (K =$\left(8.62 \times 10^{-5} eV / K\right)$). The value of T for which electrons start to jump in conduction bond is :

A. 232 K

B. 348 K

C. 400 K

D. 600 K

Answer: A

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6. Assume that the number of hole-electron pair in an intrinsic semiconductor is proportional to $e^{-\Delta E/2KT}$. Here ΔE = energy gap and $k = 8.62 \times 10^{-5} eV/\text{kelvin}$

The energy gap for silicon is $1.1eV$. The ratio of electron hole pairs at$300K$ and $400K$ is :

A. e^{-531}

B. e^{5}

C. e

D. e^{2}

Answer: A

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Exercise 2 H W Junction Diodes

1. The width of depletion region in p-n junction diode is $500nm$ and an intrinsic electric field of $6 \times 10^5 Vm^{-1}$ is also found to exist in it. What is the kinetic energy which a conduction electron must have in order to diffuse from the n-side to p-side?

A. 0.3eV

B. 0.30eV

C. 0.45eV

D. 0.60eV

Answer: B

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2. A p-n junction has acceptor impurity concentration of $10^{17} cm^{-3}$ in the p-side and donor impurity concentration of $10^{16} cm^{-3}$ in the n-side. What is the contact potential at the junction? (kT=thermal energy , instrinsic carrier concentration $n_i = 1.6 \times 10^{10} cm^{-3}$

A. $\frac{kT}{e} \log_e (4 \times 10^{12})$

B. $\frac{kT}{e} \log_e (6.3 \times 10^{22})$

C. $\frac{kT}{e} \log_e (2.56 \times 10^{20})$

D. $\frac{kT}{e} \log_e (10^{33})$

Answer: A

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3. A p-n junction diode when forward baiased has a drop of 0.5 V which is assumed to be independent of current. The current in excess of 10 mA through the diode produces a large joule heating which damages (burns) the diode. If we want to use a 15.V battery to forward bias diode a resistor of resistance $a \times 10^{2}\Omega$ is to be used in serise with the diode so that the maximum current does not exceed 5mA. what is the value of a?

A. 1

B. 2

C. 3

D. 4

Answer: B

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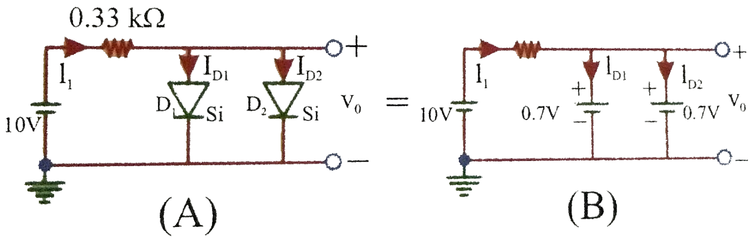
4. In the circuit shown in figure (1), the V_0, I_1, I_{D_1}, and I_{D_3} are respectively.

(A) 

A. $0.5V, 25mA, 15mA$

B. $0.7V, 28.18mA, 14.09mA$

C. $0.4V, 15mA, 20mA$

D. $0.3V, 15.06mA, 20.18mA$

Answer: B

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5. For a junction diode, the ratio of forward current (I_f) and reverse current is.

$[I_e$ = electronic charge,

V = voltage applied across junction,

k = Boltzmann constant

T = temperature in kelvin].

A. $e^{-v/kT}$

B. $e^{v/kT}$

C. $\left(e^{eV/kT}-1\right)$

D. $\left(e^{V/kT}-1\right)$

Answer: C

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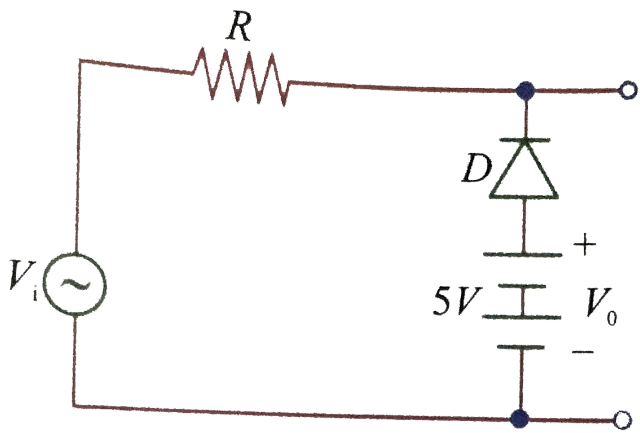
Exercise 2 H W Applications Of Junction Diode As Rectifier

1. In the diagram D an ideal diode and an alternating voltage of peak value $10V$ is connected as input V_1. Which of the following diagram represents the correct wavelength of output voltage V_θ ?



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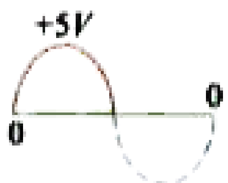
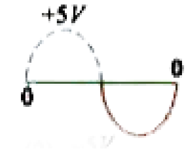
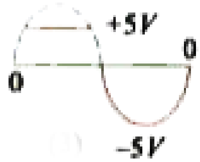
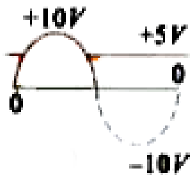
A. 

B. 

C. 

D. 

Answer: D

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2. A full wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at 25Ω. The transformer r.m.s. secondary voltage from centre tap to each end of the secondary is 50V and land resistance is 975Ω. Find the mean load current

A. $45 \times 10^{-3} A$

B. $22.5 \times 10^{-3} A$

C. $90 \times 10^{-3} A$

D. $180 \times 10^{-3} A$

Answer: A

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3. Find the r.m.s value of load current based on data given in the question no 10.

A. $100 \times 10^{-3} A$

B. $50 \times 10^{-3} A$

C. $200 \times 10^{-3} A$

D. $150 \times 10^{-3} A$

Answer: B

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4. In a full wave junction diode rectifier, the input a.c. has r.m.s. value of $20V$. The transformer used is a step up transformer having primary and secondary turns ratio $1:2$. Calculate the d.c. and a.c. voltage in the rectified output.

A. $27.14V, 36V$

B. $36V, 27, 14V$

C. $72V, 54.28V$

D. $54.28V, 72V$

Answer: B

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Exercise 2 H W Transistors

1. 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. Find the input signal voltage and base current, if the base resistance is $1k\Omega$.

A. 0.02V

B. 0.01V

C. 0.03V

D. 0.04V

Answer: B

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2. In a common emitter amplifier the load resistance of the output circuit is 1000 times the load resistance of the input circuit. If $\alpha = 0.98$, then the voltage gain is $a \times 10^4$. The integer value of a is.

A. 4

B. 5

C. 6

D. 7

Answer: B

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3. For a transistor connected in common emitter mode, the voltage drop across the collector is 2V and beta is 50. If R_c is $2k\Omega$, the base current is $a \times 10^{-5}A$. What is the value of a ?

A. 3

B. 4

C. 2

D. 1

Answer: C

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4. In an n-p-n transistor 10^{10} electrons enter the emitter in 10^{-6}s. If 2% of the electrons are lost in the base, find the current transfer ratio and the current amplification factor.

A. 0.98, 49

B. 1.96, 98

C. 0.49, 98

D. 1.96, 49

Answer: A

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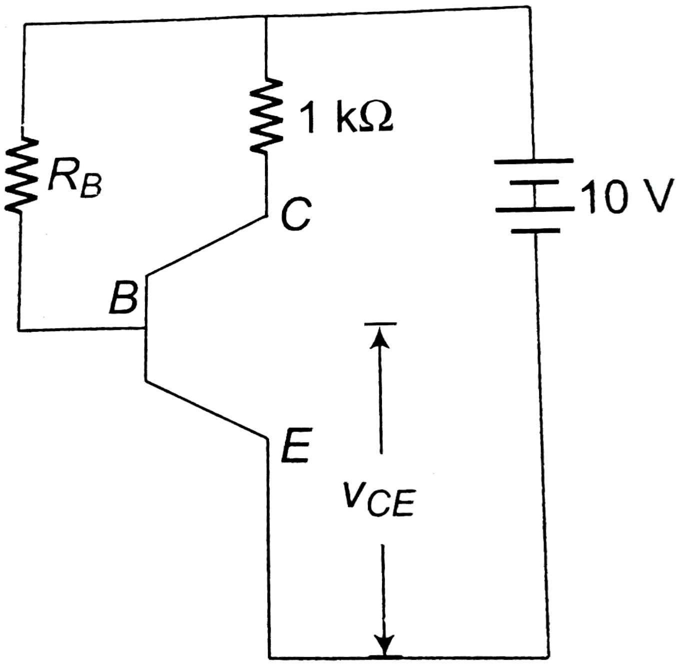
5. In the cuircuit shown here the transistor used has a current gain $\beta = 100$. What should be the bias resistor R_{BE} so that

$V_{CE} = 5V$(neglect V_{BE})



A. $200k\Omega$

B. $1k\Omega$

C. $500k\Omega$

D. $2k\Omega$

Answer: A

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6. An N-P-N transistor is connected in common-emitter configuration in which collector supply is 8V and the voltage drop across the load resistance of 800Ω connected in the collector circuit is 0.8V. If current amplification factor is 25/26 (If the internal resistance of the transistor is 200Ω), the collector-emitter voltage, voltage gain and power gain are respectively.

A. $5.2V, 1.86, 3$

B. $6.2V, 186, 5.5$

C. $7.2V, 3.86, 3.698$

D. $4.91, 3.15$

Answer: C

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7. 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.

A. $4k\Omega$

B. $14k\Omega$

C. $28k\Omega$

D. $54k\Omega$

Answer: B

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

A. $1k\Omega$

B. $2k\Omega$

C. $3k\Omega$

D. $4k\Omega$

Answer: A

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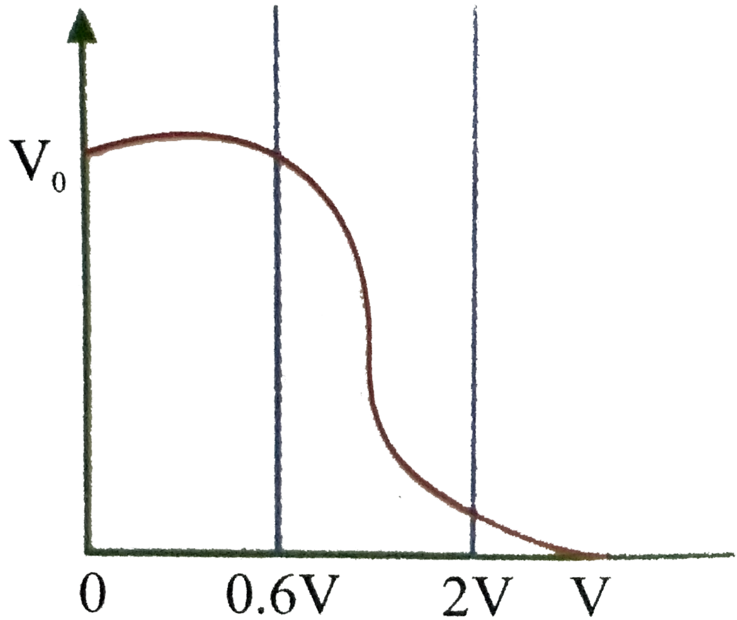
9. Figure shows the transfer characteristics of a base biased CE transistor. Which of the following statements are true ?



(A) At $V_1 = 0.14V$ transistors is in active state

(B) At $V_1 = 1V$ it can be used as an amplifier

(C) At $V_1 = 0.5V$, it can be used as a switch turned off

(D) At $V_1 = 2.5V$, it can be used as switch turned on

A. A, B, C

B. B, C, D

C. A, C, D

D. A, B, D

Answer: B

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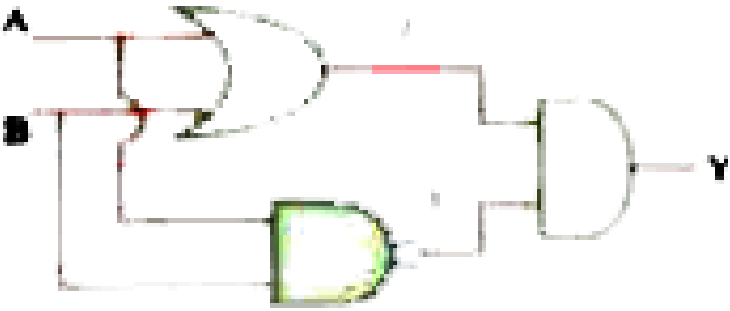
Exercise 2 H W Logic Gate

1. The following configuration of gates is equivalent to



A. NAND gate

B. XOR gate

C. OR gate

D. NOR gate

Answer: B

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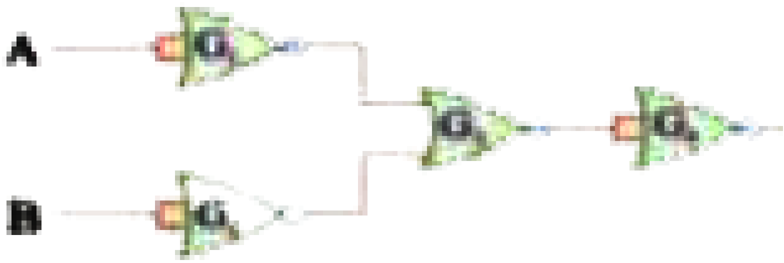
2. The combination of the gates shown below produces



A. AND gate

B. XOR gate

C. NOR gate

D. NAND gate

Answer: D

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3. Which of the following truth tables is true?

A. $\begin{array}{ccc} A & B & Y \\ 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{array}$

B. $\begin{array}{ccc} A & B & Y \\ 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{array}$

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

C.

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

D.

Answer: A

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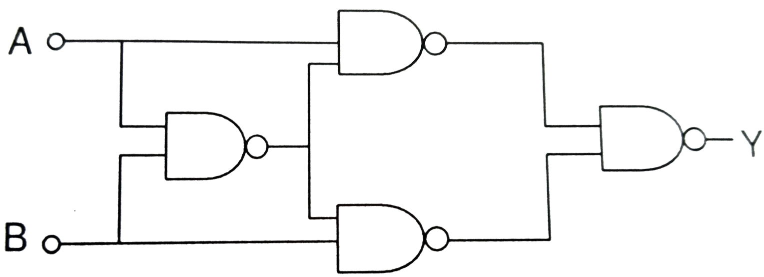
4. Truth table for system of four NAND gates as shown in figure is



A.

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

B.

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

C.

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

D.

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

Answer: A

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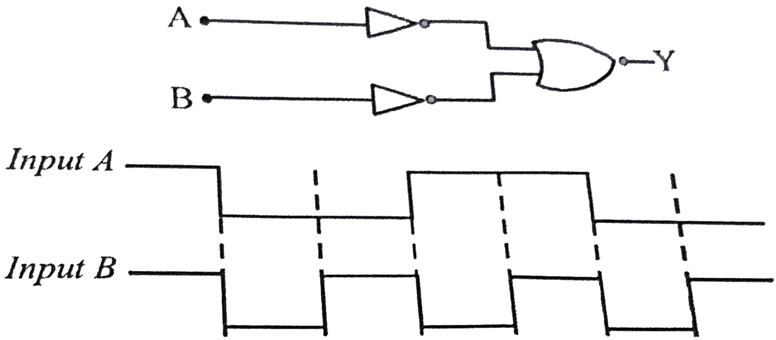
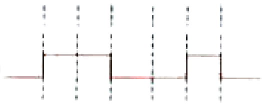
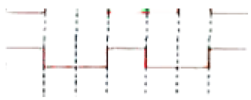
5. The logic circuit shown below has the input waveforms 'A' and 'B' as shown. Pick out the correct output waveform



A. 

B. 

C. 

D. 

Answer: A

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6. Logic gates X and Y have the truth tables shown below

P	Q	R	P	R
0	0	0	0	1
1	0	0	1	0
0	1	0		
1	1	1		

When the output of X is connected to the input of Y, the resulting combination is equivalent to a single.

A. NOT gate

B. OR gate

C. NOR gate

D. NAND gate

Answer: D

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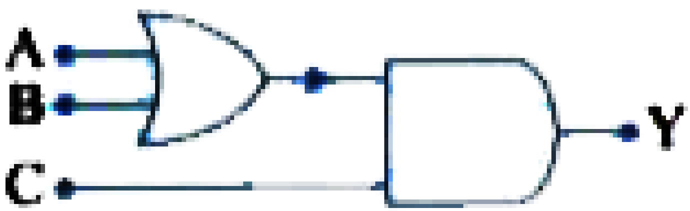
Exercise 3

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

A. 4, 3.84

B. 3.69, 3.84

C. 4, 4

D. 4, 3,69

Answer: A

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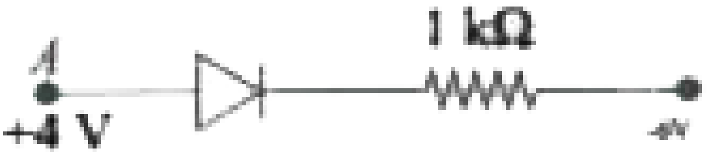
3. Consider the junction diode as ideal. The value of current flowing through AB is:



A. $0A$

B. $10^{-2}A$

C. $10^{-1}A$

D. $10^{-3}A$

Answer: B

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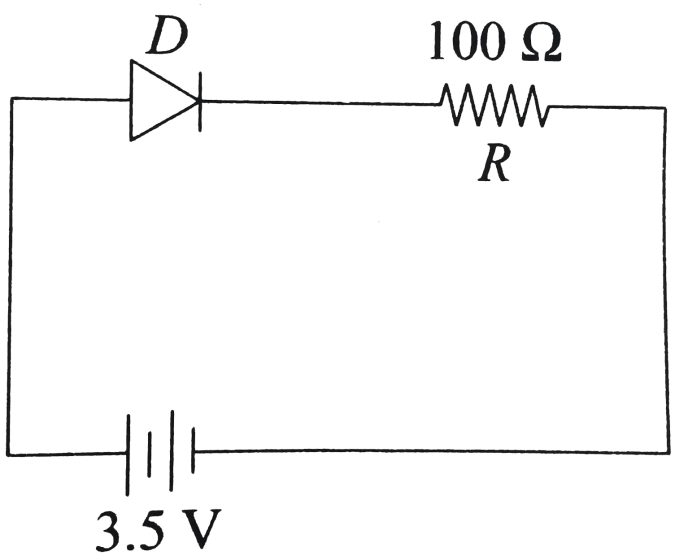
4. In the given figure, a diode D is connected to an external resistance $R = 100\Omega$ and an emf of $3.5V$. If the barrier potential developed across the diode is $0.5V$, the current in the circuit will be :



A. 35 mA

B. 30 mA

C. 40 mA

D. 20 mA

Answer: B

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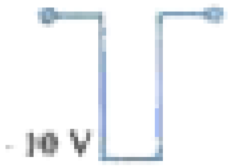
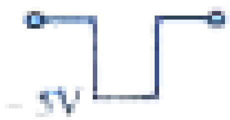
5. In the given figure, a diode D is connected to an external resistance $R = 100\Omega$ and an emf of 3.5V. If the barrier potential developed across the diode is 0.5 V, the current in the circuit will be:

then the output across R_L will be

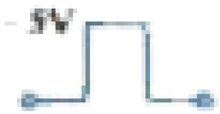
A.



B.



C.



D.

Answer: D

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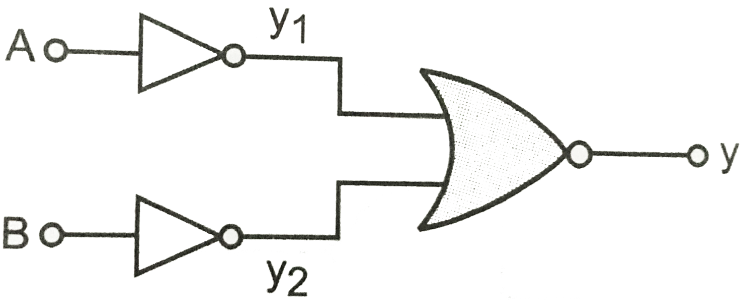
6. Which logic gate is represented by the following combination of logic gates



A. OR

B. NAND

C. AND

D. NOR

Answer: C

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7. The barrier potential of a p-n junction depends on : (i) type of semiconductor material (ii) amount of doping (iii) temperature.

Which is one of the following is correct?

A. (i) and (ii) only

B. (ii) only

C. (ii) and (iii) only

D. (i), (ii) and (iii)

Answer: D

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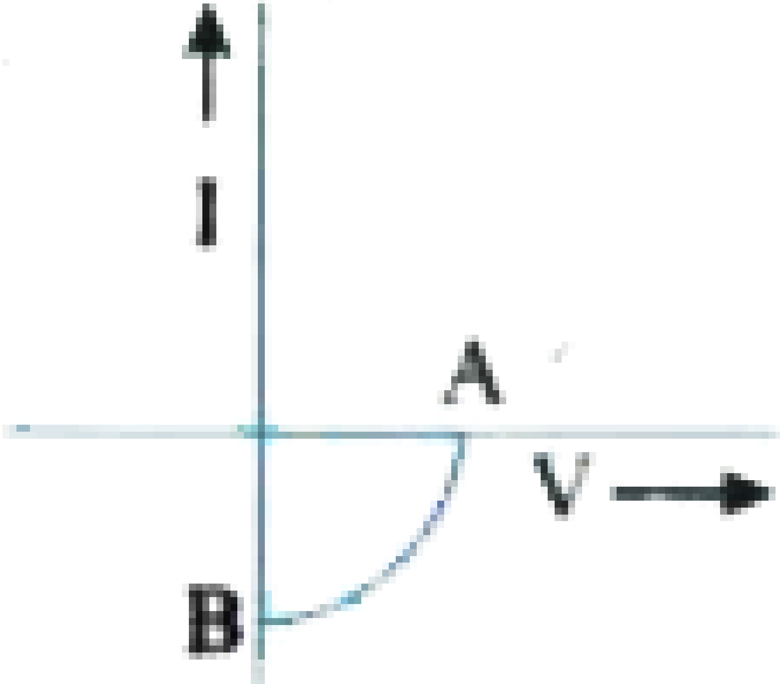
8. The given graph represents V-1 characteristic for a semiconductor device.



Which of the following statement is correct?

A. It is V-1 characteristic 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 a photodiode and points A and B represent open circuit voltage and current, respectively

D. It is for an LED and points A and B represents open circuit voltage and short circuit currrent respectively

Answer: A

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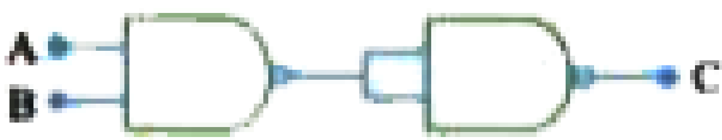
9. The output (X) of the logic circuit shown in figure will be



A. $X = \overline{\overline{A}}.\overline{\overline{B}}$

B. $X = \overline{A.B}$

C. $X = A . B$

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

Answer: C

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

B. 1.5G

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

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

Answer: A

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

A. Electrons are majority carriers and trivalent atom are dopants

B. Electrons are minority carriers and pentavalent atoms are dopants

C. Holes are minority carriers and pentavalent atoms are dopants

D. Holes are manjority carriers and trivalent atoms are dopants

Answer: C

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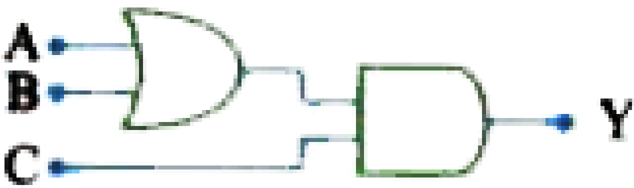
12. To get on output Y=1 in given circurit which of the following input will be correct



A. $\begin{matrix} A & B & C \\ 1 & 0 & 0 \end{matrix}$

B. $\begin{matrix} A & B & C \\ 1 & 0 & 1 \end{matrix}$

C. $\begin{matrix} A & B & C \\ 1 & 1 & 0 \end{matrix}$

D. $\begin{matrix} A & B & C \\ 0 & 1 & 0 \end{matrix}$

Answer: B

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13. 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 $2mA$. 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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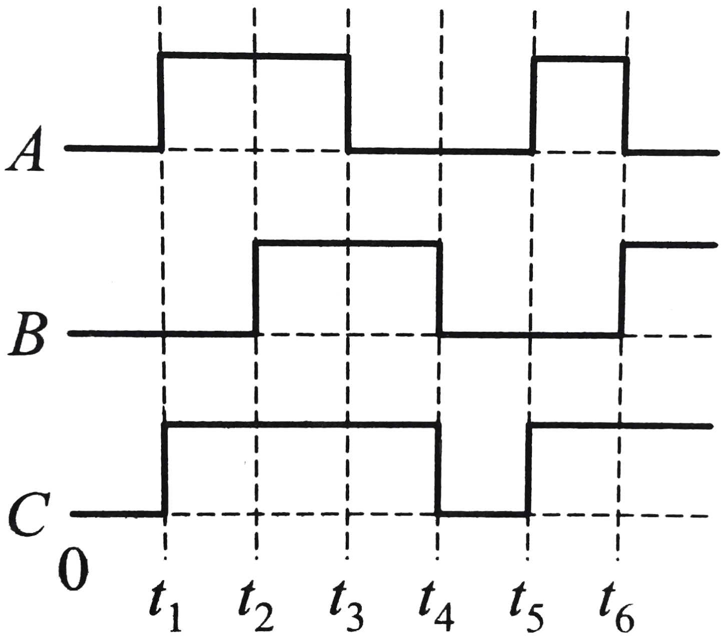
14. The figure shows a logic circuit with two inputs A and B and the output C. The voltage wave forms across A, B and C are as given. The logic circuit gate is



A. NAND gate

B. OR gate

C. NOR gate

D. AND gate

Answer: B

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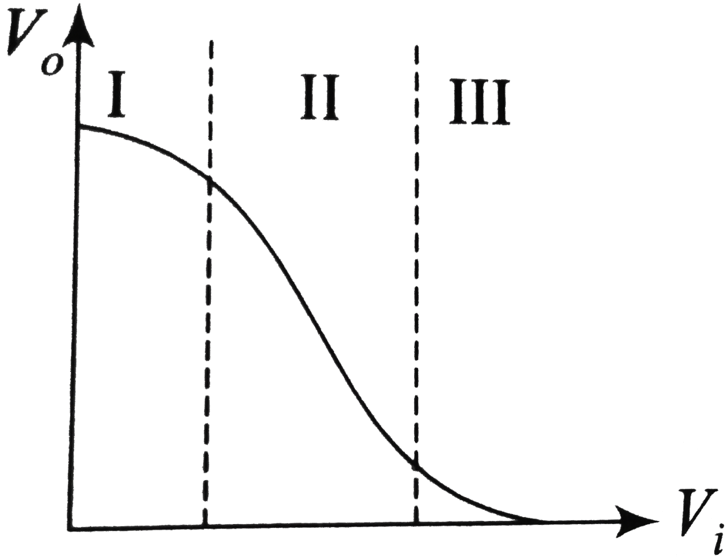
15. Transfer characterstics [output voltage (V_o) vs. input voltage (V_i)] for a base biased transistor in CE configuration is as shown in the figure. For using transfor as a which, it is used



A. in region I

B. in region II

C. both in region (I) and (III)

D. in region II

Answer: C

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16. 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 third orbit, whereas for Si they lie in the fourth orbit

B. In case of C the valance band is not completely filled even at at absolute zero temperature

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

D. 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 orbit

Answer: D

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17. 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. 10 mV

B. 0.1V

C. 1.0 V

D. 1 mV

Answer: A

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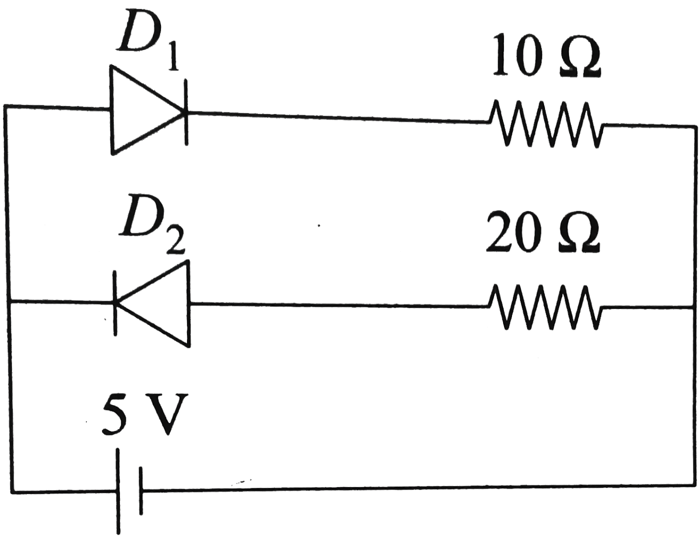
18. Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is



A. 0.5 A

B. 0.75 A

C. zero

D. 0.2A

Answer: A

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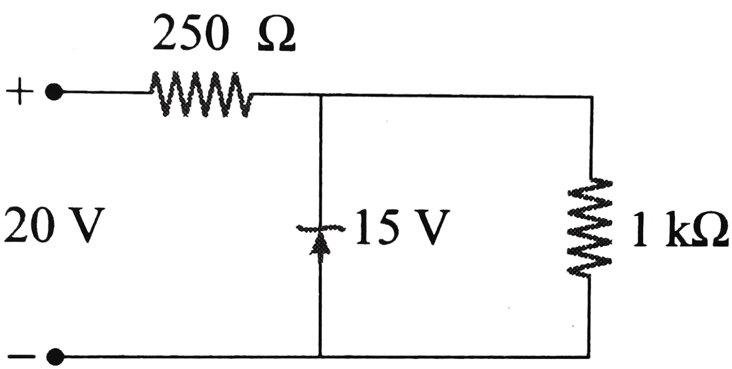
19. A zener diode, having breakdown voltage equal to $15V$ is used in a voltage regulator circuit shown in the figure. The current through the diode is



A. 10 mA

B. 15 mA

C. 20 mA

D. 5 mA

Answer: D

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

A. n-type with electron concentration $n_e \times 5 \times 10^{22} m^{-3}$

B. p-type with electron concentration $n_e \times 2.5 \times 10^{10} m^{-3}$

C. n-type with electron concentration $n_e \times 2.5 \times 10^{23} m^{-3}$

D. p-type having electron concentration $n_e \times 5 \times 10^{9} m^{-3}$

Answer: D

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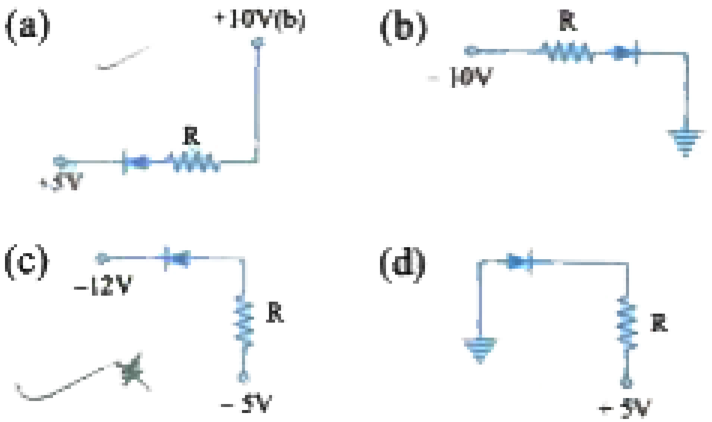
21. In the following figure, the diodes, which are forward biased, are



A. c only

B. c and a

C. b and d

D. a, b and d

Answer: B

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

A. the antimony becomes an acceptor atom

B. there will be more free electron than holes in the semiconductor

C. its resistance is increased

D. it becomes a p-type semiconductor

Answer: B

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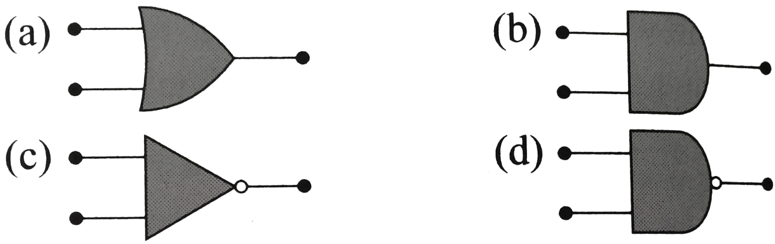
23. Symbolic representation of four logic gates are shown as



A. c, b and a

B. c, b and d

C. b, d and c

D. b, c and d

Answer: C

Watch Video Solution

24. In forward biasing of the p-n junction:

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

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

C. the positive teminal of the battery is connected to p-side and the depletion region become thin

D.

Answer: C

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25. 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 $10 mA$ to $20 mA$. The current gain is

A. 75

B. 100

C. 25

D. 50

Answer: D

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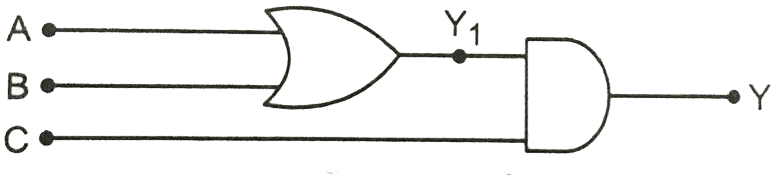
26. To get an output $y = 1$ from the circuit shown below, the input must be



A. $\begin{matrix} A & B & C \\ 0 & 1 & 0 \end{matrix}$

B. $\begin{matrix} A & B & C \\ 0 & 0 & 1 \end{matrix}$

C. $\begin{matrix} A & B & C \\ 1 & 0 & 1 \end{matrix}$

D. $\begin{matrix} A & B & C \\ 1 & 0 & 0 \end{matrix}$

Answer: C

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

A. Junction diode

B. Integruled circuit

C. Junction transistor

D. Zener diode

Answer: B

Watch Video Solution

28. Which one of the following bonds produces a solid that reflects light in the visible region and whose electrical conductivity decreases with temperature and has high melting point?

A. metalic bonding

B. van der Waal's bonding

C. ionic bonding k

D. covalent bonding

Answer: A

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29. Which one of the following statement is false?

A. Pure Si doped with trivalent impurities gives a p-type semiconductor

B. Majority carriers in a n-type semiconductor are holes

C. Minority carriers in a p-type semiconductor are electrons

D. The resistance of nitrinsic semiconductor decreases with increase of temperature

Answer: B

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

A. $6.8Å$

B. $4.3Å$

C. $3.0Å$

D. $8.6Å$

Answer: B

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31. The number of beta particles emitter by radioactive sustance is twice the number of alpha particles emitter by it. The resulting daughter is an

A. isobar of parent

B. isomer of parent

C. iostone of parent

D. isotope of parent

Answer: D

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32. 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 $200\mu A$ produces a change in the collector current from $5mA$ to $10mA$. The current gain is

A. 75

B. 100

C. 150

D. 50

Answer: D

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33. A $p-n$ photodiode is fabricated from a semiconductor with a band gap of $2.5eV$. It can detect a signal of wavelength

A. 6000Å

B. $4000 nm$

C. 6000 nm

D. 4000Å

Answer: D

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34. The circuit is equivalent to

A. AND gate

B. NAND gate

C. NOR gate

D. OR gate

Answer: C

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35. 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. $10 \times 10^{14} Hz$

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

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

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

Answer: B

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

A. 90

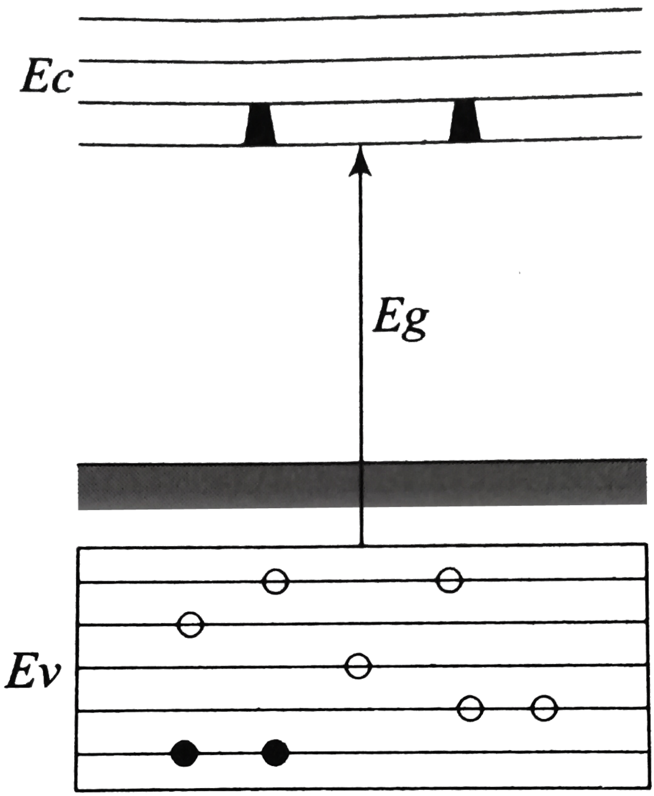
B. 10

C. 1.25

D. 100

Answer: D

37. 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



A. p-type semiconductor

B. insulator

C. metal

D. n-type semiconductor

Answer: A

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38. For a cubic crystal structure which one of the following relations indicating the cell characterstic is correct?

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

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

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

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

Answer: D

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

A. 500

B. 1000

C. 1250

D. 100

Answer: C

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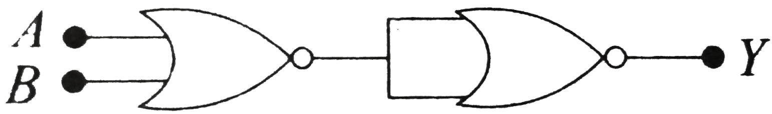
40. In the following circuit, the output Y for all possible inputs A and B is expressed by the truth table:



A.

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

B.

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

C.

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

D.

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

Answer: D

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41. A forward biased diode is

A. 

B. 

C. 

D. 

Answer: D

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42. 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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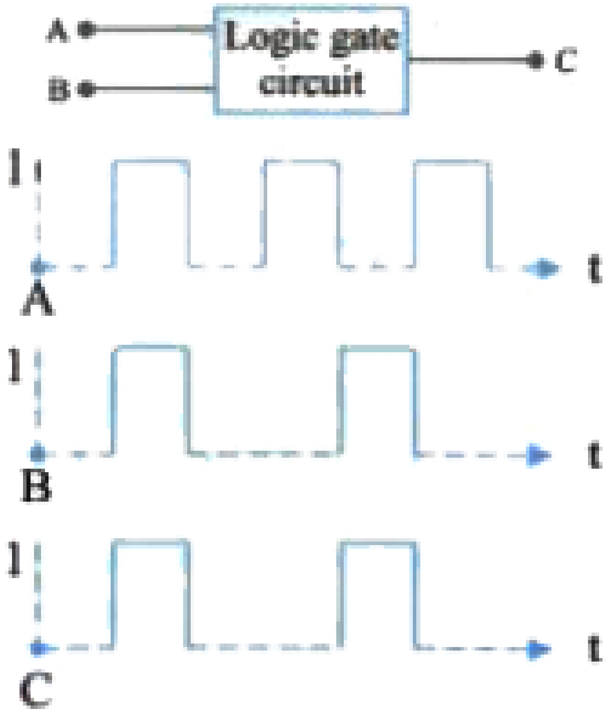
43. The following figure shown a logic gate circuit with ttwo inputs A and B and the C are as shown below



The logic circuit gate is

A. AND gate

B. NAND gate

C. NOR gate

D. OR gate

Answer: A

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Exercise 4

1. Which inpurity is doped in Si to form N-type semicondutor ?

A. A

B. B

C. As

D. None of these

Answer: C

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2. In a semiconducto

A. The number of free electrons is more than that in a conductor

B. There are o free electrons at 0 K

C. None of these

D.

Answer: C

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3. The energy band gap is maximum in

A. Metals

B. Superconductors

C. Insulators

D. Semiconductors

Answer: C

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4. The part of a transistor which is most heavily doped to produce large number of majority carriers is

A. emitter

B. base

C. collector

D. Can be any of the above thee

Answer: A

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5. By increasing the temperature the specific resistance of a conductor and a semiconductor

A. increase for both

B. decreases for both

C. increases, decreases

D. decreases, increases

Answer: C

Watch Video Solution

6. At absolute zero , Si acts as

A. non-metal

B. metal

C. Insulators

D. none of these

Answer: C

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7. A strip of copper and another of germanium are cooled from room temperature to 80 K. The resistance of

A. each ot these decreases

B. copper strip increases and that of germanium decreaseses

C. copper strip decreases and that of germanium increases

D. each of these increases

Answer: C

Watch Video Solution

8. In the middle of the depletion layer of a reverse - biased $p-n$ junction , the

A. potential is zero

B. electric field is zero

C. potential is maximum

D. electric field is maximum

Answer: D

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9. The difference in the variation of resistance with temperature in a metal and a semiconductor arises essentially due to the difference in the

A. variation of scattering mechanism with temperature

B. crystal structure

C. variation of the number of charge carries with temperature

D. type of bonding

Answer: C

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10. A piece of copper and another of germanium are cooled from room temperature to 77 K, the resistance of -

A. each ot these decreases

B. each of them increases

C. of Cu decreases and Ge increases

D. of Cu increases and Ge decreases

Answer: B

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11. The manifestation of band structure in solids is due to

A. Heisenberg's uyncertainity principle

B. Pauli's exchusion principle

C. Bohr's correspondence principle

D. Boltzmann's law

Answer: B

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12. Energy band in solids are a consequence of

A. Ohm's Law

B. Pauli's exchusion principle

C. Bohr' theory

D. Heisenberg's uncertainity principle

Answer: B

Watch Video Solution

13. When forward bias is applied to a $P-N$ junction, then what happence to the potential barrier V_B, and the width of charge depleted region x?

A. V_B increases , x decreases

B. V_B decreases , x increases

C. V_B increases, x increase

D. V_B decreases, x decreases

Answer: D

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14. When NPN transistor is used as an amplifier

A. Eelctron move from base to collector

B. Holes move from emitter to base

C. Electrons move from collector base

D. Holes move from base to emitter

Answer: A

Watch Video Solution

15. For a transistor amplifier in common emitter configuration for load impedance of $1k\Omega$. $\left(h_{fe} = 50 \text{ and } h_{oe} = 25 \times 10^{-6}\right)$

the current gain is

A. -5.2

B. -15.7

C. -28.8

D. -48.76

Answer: D

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16. The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than 2480 nm is incident on it. The band gap (in eV) for the semiconductor is $[hc = 1242 eV nm]$

A. $0.7 eV$

B. $0.5eV$

C. $0.6eV$

D. $1.1eV$

Answer: B

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17. In a full wave rectifier circuit operating from $50Hz$ mains frequency , the fundamental frequency in the ripple would be

A. $70.7Hz$

B. $100Hz$

C. $25Hz$

D. $50HZ$

Answer: B

Watch Video Solution

18. In a common-base amplifier, the phase difference between the input signal voltage and output voltage is :

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

B. 0

C. π

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

Answer: B

Watch Video Solution

19. A solid which is not transperent to visible light and whose conductivily increase with temperature is formed by

A. van der Waals binding

B. metalling binding

C. ionic binding

D. covalent binding

Answer: D

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20. If the ratio of the concentration of electron to that of holes in a semiconductor is $\frac{7}{5}$ and the ratio of current is $\frac{7}{4}$ then what is the ratio of their drift velocities ?

A. $\frac{4}{7}$

B. $\frac{5}{8}$

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

D. $\frac{5}{4}$

Answer: D

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21. In a common base mode of transistor, collector current is $5.488mA$ for an emitter current of $5.60mA$. The value of the base current amplification factor (β) will be :

A. 48

B. 49

C. 50

D. 51

Answer: B

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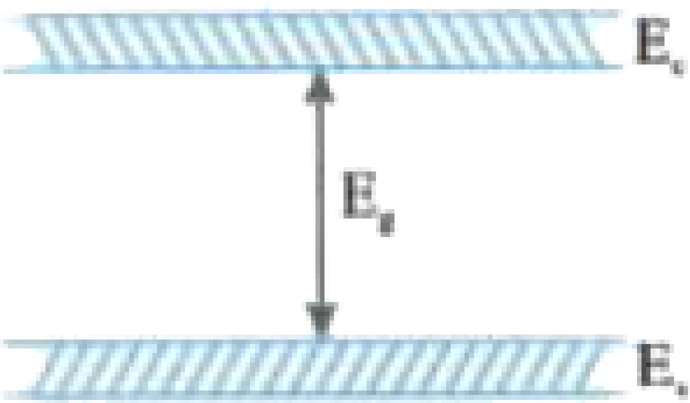
22. If the lattice constant of this semiconductor s decreases, then which of the following is correct ?



A. All E_c, $E_g ad E_v$ decrease

B. All $E_c, E_g ad E_v$ increase

C. F_c and E_v increases but E_g decreases

D. F_c and E_v decreases but E_g increases

Answer: D

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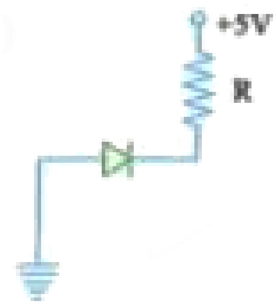
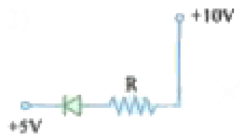
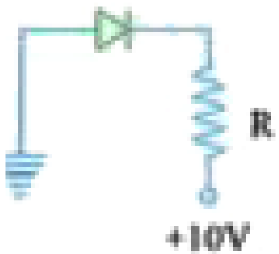
23. In the following, which one of the diodes is reverse biased ?



A.

B. 

C. 

D. 

Answer: A

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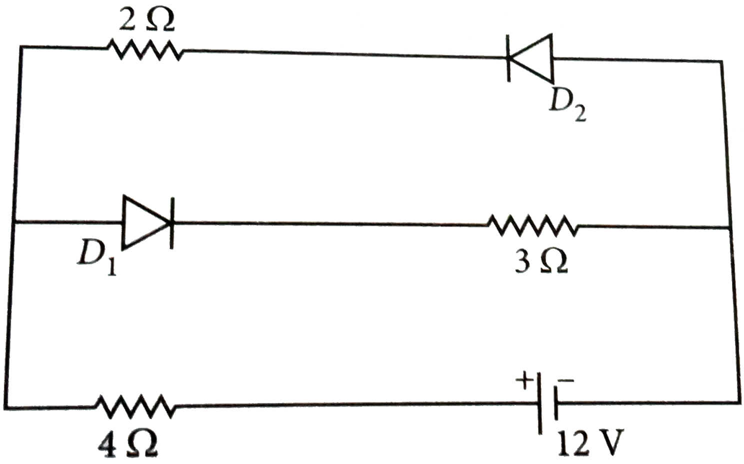
24. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?



A. $1.33A$

B. $1.71A$

C. $2.00A$

D. $2.31A$

Answer: C

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25. Carbon, silicon and germanium have four valence electrons each. The most appropriate statement for these elements (at room temperature) is

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

B. The number of free electrons for conductions is significatn in all the three

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

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

Answer: B

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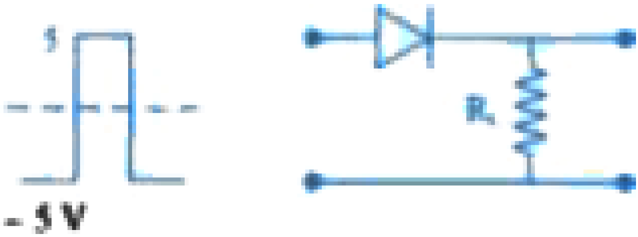
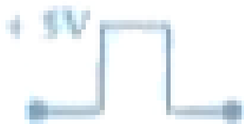
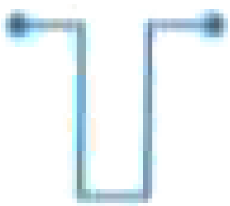
26. If a pn junction dide, a square input signal of 10 V is applied as shown



then the outuput signal across R_1 will be

A. 

B. 

C. 

D.

Answer: C

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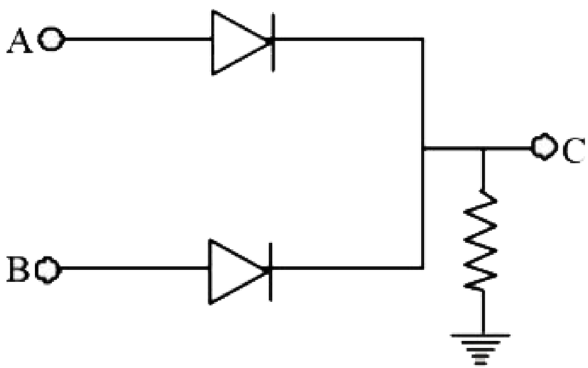
27. In the circuit below, A and B represent two inputs and C represents the output.



The circuit represents

A. NAND gate

B. OR gate

C. NOR gate

D. AND gate

Answer: B

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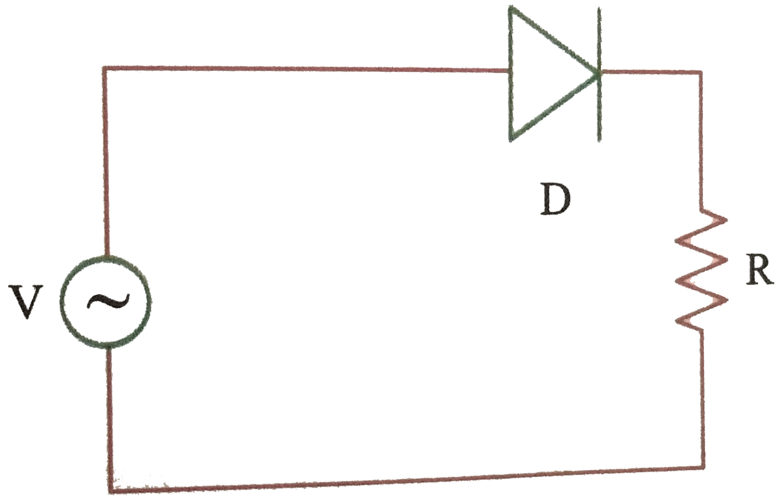
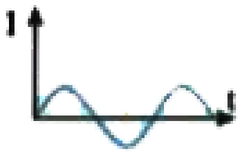
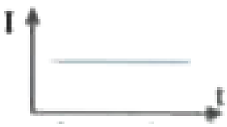
28. A $p-n$ junction (D) shown in the figure can act as a rectifier. An alternating current source (V) is connected in the circuit.



A. 

B. 

C. 

D. 

Answer: C

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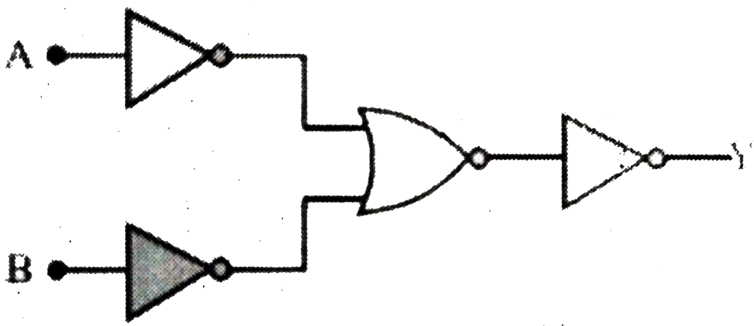
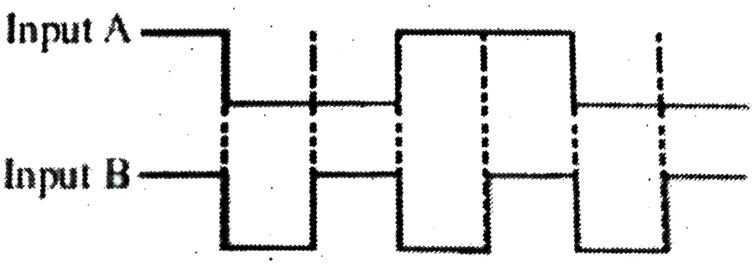
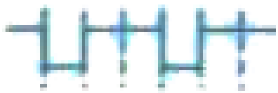
29. The logic circuit shown has the input waveforms 'A' and 'B' as shown. Pick out the correct output waveform





A. 

B. 

C. 

D. 

Answer: A

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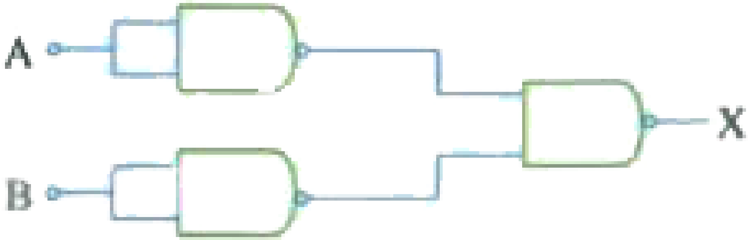
30. The combination of gates shown below yields



A. NAND gate

B. OR gate

C. NOT gate

D. XOR gate

Answer: B

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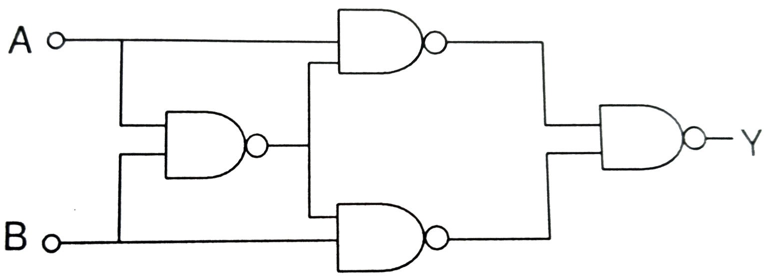
31. Truth table for system of four NAND gates as shown in figure is



A.

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

B.

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

C.

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

D.

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

Answer: A

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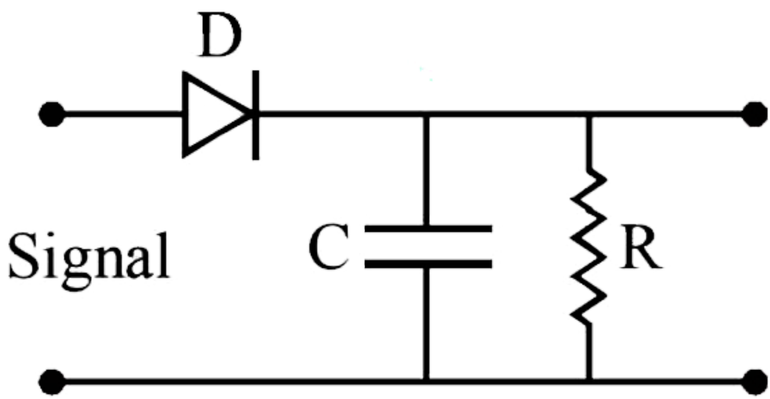
32. A diode detector is used to detect an amplitude modulated wave of 60% modulation by using a condense of capacity 250 picofarad in parallel with a load resistance 100 kilo ohm find the maximum modulated which could be find the maximum modulated frequency which could be detected by it



A. $10.62 kHz$

B. $5.31 MHz$

C. 5.31 kHz

D. 10.62 MHz

Answer: A

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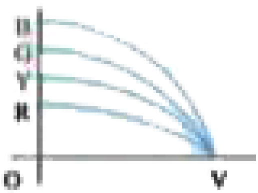
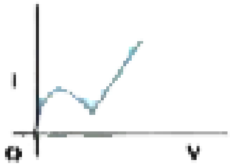
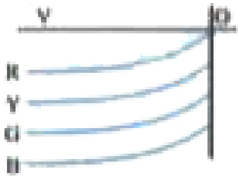
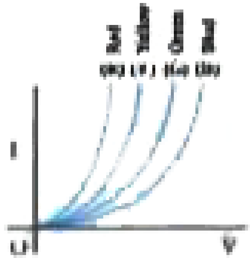
33. The $I - V$ characteristic of an LED is.

A. 

B. 

C. 

D. 

Answer: D

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34. The currect voltage relation of diode is given by $1 = \left(e^{1000V/T} - 1\right) mA$, where the applied voltage V is in volt and the temperature T is in degree Kelvin. If a student makes an error measuring $\pm 0.01V$ while measuring the current of $5mA$ at $300K$, what will be error in the value of current in mA?

A. $0.5mA$

B. $0.05mA$

C. $0.2mA$

D. $0.02mA$

Answer: C

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35. The forward biased diode connection is

A. 

B. 

C. 

D. 

Answer: C

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Additional Exercise Assertion And Reason Type Questions

1. Assertion : the following circuit represents 'OR' gate

Reason : for the above circuit $Y = \overline{X} = \overline{\overline{A+B}} + A + B$

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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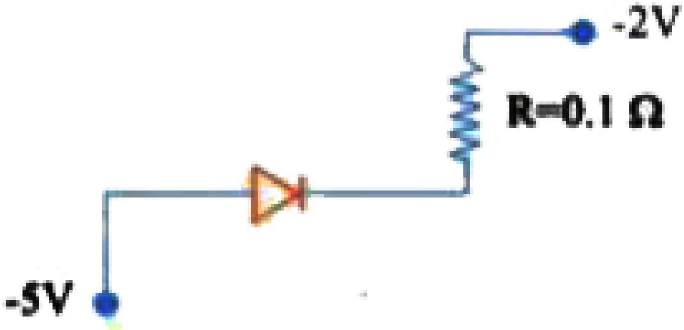
2. Assertion : In the following circuit the potential drop across the resistance is zero.



Reason : The given resistance has low value.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 2

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3. Assertion: NOT gate is also called inverter circuit.

Reason: NOT gate inverts the input order.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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4. Assertion: The current gain in common base circuit is always less than one.

Reason: At constant collector votalge the change in collector current is more than the change in emitter current.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 3

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5. Assertion : The dominant mechanism for motion of charge carreis in forward and reverse biased silicon P-N junction are drit in both forward and reverse bias.

Reaon : In reverse biasing, no current flow through the junction.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 4

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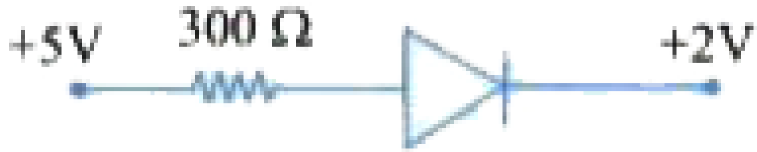
6. Assertion : The value of current through p-n junction in the given figure will be 10 mA.



Reason : In the above figure, p-side is at higher potential than n-side.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 2

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7. Statement-I : A p-n junction with reverse bias can be used as a photodiode to measure light intensity.

Statement-II : In a reverse bias condition the current in small but it is more sensitive to changes in incident light intensity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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8. Assertion : In common base configuration, the current gain of the transistor is less than unity.

Reason : The collector terminal is revers biased for amplification.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 2

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9. Statement-I : Germanium is preferred over silicon for making semiconductor devices

Statement-II : Energy gap for Ge is more than that of SI

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 4

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10. Assertion : The temparature coefficient of resistance is positive for metals and negative for semiconductors.

Reason : On raising the temperature in metals drift velocity increases but in semiconductors more change carries are released.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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11. Assertion : For a given applied voltage, conduction current in n-type semiconductor is more than in p-type semiconductors.

Reason : Mobility of electrons is greater than that of holes.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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12. Assertion : We cannot meausre that potential barrier of p-n junction by putting a sensitive voltmeter across its terminals.

Reason: In the depletion layer, there are no free elctrons or holes and in the absence of forward bias, it offers, infinite, resistance.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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13. Assertion : In Zener diode depletion layer is thin.

Reason : In reverse bias, strong electric field exists across the potential barrier.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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14. Statement-I : A p-n junction with reverse bias can be used as a photodiode to measure light intensity.

Statement-II : In a reverse bias condition the current in small but it is more sensitive to changes in incident light intensity.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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15. Statement-I : When base region has larger width, the collector current decreases.

Statement-II : In transistor, sum of base current and collector current is equal to emitter current.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 2

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16. Statement-I : To be used as amplifier, the transistor in the common emitter confuration is preferred to the common base configuration.

Statement-II : In the common emitter, the signal is applied between emitter and base.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 2

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17. Assertion : A transistor amplifier operates in active region.

Reason : In active region transistor characteristic is liner.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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18. 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 assertion and reason are true and the reason is the correct explanation of the assertion

B. If both assertion and reason are true but the reason is not the correct explanation of the assertion

C. If assertio is true statement but reason is false.

D. If both assertion and reason are false statement

Answer: 1

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19. Assertion : In transistor, common emitter configuration is used to make a NOT gate.

Reason : In common emitter configuration, output voltage and input voltage have 180° phase difference.

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