PHYSICS

BOOKS - MTG PHYSICS (ENGLISH)

SEMICONDUCTOR ELECTRONICS : MATERIALS , DEVICES AND SIMPLE CIRCUITS

Mcq

1. At absolute zero , Si acts as

A. metal

B. semiconductor

C. insulator

D. none of these

Answer: C

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2. In good conductors of electricity, the type of bonding that exists is

A. Van der Waals

B. covalent

C. ionic

D. metallic

Answer: D

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

A. Heisenberg uncertainty principle

B. Pauli's exclusion principle

C. Bohr's correspondence principle

D. Boltzmann law

Answer: B

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4. Carbon , silicon and germanium have four valence elcectrons 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 ture ?

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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5. If the energy of a photon of sodium light (λ =589 nm) equals the band gap of semiconductor, the minimum energy required to create hole electron pair

A. 1.1 eV

B. 2.1 eV

C. 3.2 eV

D. 1.5 eV

Answer: B

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6. 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.

A. 0.9

B. 0.7

C. 0.5

D. 1.1

Answer: C

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7. Find the wavelength of light that may excite an electron in the valence band of diamond to the conduction band. The energy gap is 5.50 eV

A. 226 nm

B. 312 nm

C. 432 nm

D. 550 nm

Answer: A

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8. The maximum wavelength of electromagnetic radiation, which can create a hole-electron pair in germanium. (Given that forbidden energy gap in germanium is 0.72 eV)

A. 1.7×10^{-6} m

B. 1.5×10^{-5} m

C. 1.3×10^{-4} m

D. 1.9×10^{-5} m

Answer: A

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9. The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature

A. increases exponentially with increasing band gap

B. decreases exponentially with increasing band gap

C. decreases with increasing temperature.

D. is independent of the temperature and band gap.

Answer: B

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10. Which of the following equations correctly represents the temperature variation of energy gap between the conduction and valence bands for Si?

A. $E_{g(T)} = 0.70 - 2.23 \times 10^{-4}$ T eV

B. $E_{g(T)} = 0.70 + 2.23 \times 10^{-4}$ T eV

C. $E_{g(T)} = 1.10 - 3.60 \times 10^{-4}$ T eV

D. $E_{g(T)} = 1.10 + 3.60 \times 10^{-4}$ T eV

Answer: C

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11. An intrinsic semiconductor has a resistivity of 0.50 Ω m at room temperature. Find the intrinsic carrier concentration if the mobilities of electrons and holes are $0.39 m^2 V^{-1} s^{-1}$ and $0.11 m^2 V^{-1} s^{-1}$ respectively

A. $1.2 \times 10^{18} m^{-3}$

B. $2.5 \times 10^{19} m^{-3}$

C. $1.9 \times 10^{20} m^{-3}$

D. $3.1 \times 10^{21} m^{-3}$

Answer: B

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12. In pure semiconductor, the number of conduction electrons is 6×10^{18} per cubic metre. How many holes are there in a sample of size 1 cm x 1 cm x 1 mm?

A. 3×10^{10}

B. 6×10^{11}

C. 3×10^{11}

D. 6×10^{10}

Answer: B

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13. Mobilities of electorns and holes in a sample of intrinsic germanium at room temperature are $0.54 m^2 V^{-1} s^{-1}$ and $0.18 m^2 V^{-1} s^{-1}$ respectively.

If the electron and hole densities are equal to

$3.6 \times 10^{19} m^{-3}$ calculate the germanium conductivity.

A. $4.14 Sm^{-1}$

B. $2.12 Sm^{-1}$

C. $1.13 Sm^{-1}$

D. $5.6 Sm^{-1}$

Answer: A

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14. A block of pure silicon at $300K$ has a length of $10cm$ and an area of $1.0cm^2$. A battery of emf $2V$ is connected across it. The mobility of electron is $0.14m^2v^{-1}S^{-1}$ and their number density is $1.5 \times 10^{16}m^{-3}$. The mobility of holes is $0.05m^2v^{-1}S^{-1}$.

The electron current is

A. 6.72×10^{-4} A

B. 6.72×10^{-5} A

C. 6.72×10^{-6} A

D. 6.72×10^{-7} A

Answer: D

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15. In an n- type silicon, which of the following statements is true ?

(a) Electrons are majority carries and trivalent atoms are the dopants.

(b) Electrons are majority carries and pentavalent atoms are the dopants.

(c) Holes are minority carries and paentavalent atoms are the dopants.

(d) Holes are minority carries and trivalent atoms are the dopants.

A. Electrons are majority carriers and trivalent atoms are the dopants

B. Electrons are minority carriers and pentavalent atoms are the dopants

C. Holes are minority carriers and pentavalent atoms are the dopants

D. Holes are majority carriers and trivalent atoms are the dopants.

Answer: C

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

A. its resistance is increased

B. it becomes a p-type semiconductor

C. there will be more free electrons than holes in the semiconductor

D. none of these

Answer: C

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17. In n-type semiconductor when when all donor states are filled, then the net charge density in the donor states becomes

A. 1

B. gt 1

C. lt 1, but not zero

D. zero

Answer: B

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18. Suppose a pure Si-crystal has $5 \times 10^{28} \text{atoms} m^{-3}$. It is doped by 1 ppm concentration of pentavalent As. Calculate the number of electrons and holes. Give that $n_i = 1.5 \times 10^{16} m^{-3}$.

A. $4.5 \times 10^{9} m^{-3}$

B. $4.5 \times 10^{6} m^{-3}$

C. $2.5 \times 10^{9} m^{-3}$

D. $2.5 \times 10^{6} m^{-3}$

Answer: A

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19. A semiconductor has equal electron and hole concentration of $6 \times 10^8 / m^3$. On doping with certain impurity, electron concentration increases to $9 \times 10^{12} / m^3$. (i) Identify the new semiconductor obtained after doping. (ii) Calculate the new hole concentration. (iii) How does the energy gap vary with doping?

A. 2×10^4 per m^3

B. 2×10^2 per m^3

C. 4×10^4 per m^3

D. 4×10^2 per m^3

Answer: C

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20. The number density of electrons and holes in pure silicon at 27° C are equal and its value is $2.0 \times 10^{16} m^{-3}$. On doping with indium the hole density increases to $4.5 \times 10^{22} m^{-3}$, the electron density in doped silicon is

A. $10 \times 10^9 m^{-3}$

B. $8.89 \times 10^9 m^{-3}$

C. $11 \times 10^9 m^{-3}$

D. $16.78 \times 10^9 m^{-3}$

Answer: B

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21. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon $P - N$ junction are

A. drift in forward bias, diffusion in reverse bias

B. diffusion in forward bias, drift in reverse bias

C. diffusion in both forward and reverse bias

D. drift in both forward and reverse bias

Answer: B

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22. In an unbiased p-n junction electrons diffuse from n-region to p-region because :-

A. free electrons in the n-region attract them

B. they move across the junction by the potential difference

C. hole concentration in p-region is more as compared to n-region

D. all of these

Answer: C

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23. Region which have no free electron and holes in P-N junction is

A. x-region

B. p-region

C. depletion region

D. none of these

Answer: C

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24. In the depletion region of a diode.

A. There the mobile charges exist

B. Equal number of holes and electrons exist. making the region neutral.

C. Recombination of holes and electrons has taken place

D. None of these

Answer: A

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25. In a $p-n$ junction diode, the barrier potential opposes diffusion of

A. minority carrier in both regions only

B. majority carriers only

C. electrons in p region

D. holes in p region

Answer: B

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26. A potential barrier of 0.3 V exists across a p-n junction. If the depletion region is 1 μm wide, what is the intensity of electric field in this region?

A. $2 \times 10^5 Vm^{-1}$

B. $3 \times 10^5 Vm^{-1}$

C. $4 \times 10^5 Vm^{-1}$

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

Answer: B

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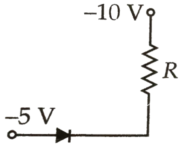
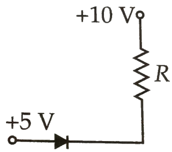
27. Which of the junction diodes shown below are forward biased ?

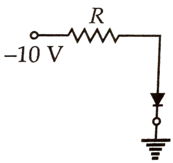
A. (a)



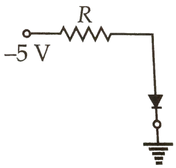
B. (b)



C. (c)



D. (d)



Answer: A

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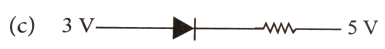
28. A forward biased diode is

A. 

B. 

C. 

D. 

Answer: A

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29. When the voltage drop across a $p.n$ junction diode is increased from $0.65V$ to $0.70V$, the change in the diode current is $5mA$. What is the dynamic resistance of the diode?

A. 5Ω

B. 10Ω

C. 20Ω

D. 25Ω

Answer: B

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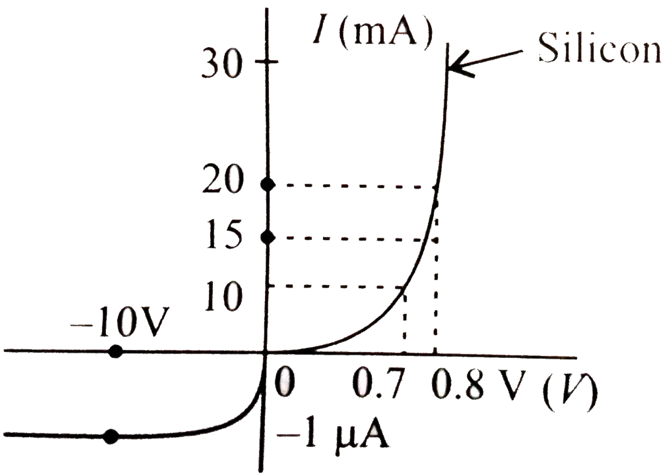
30. The V-I characteristic of a silicon diode is shown in figure . The resistance of the diode at I_D=15 mA is



A. 5Ω

B. 10Ω

C. 2Ω

D. 20Ω

Answer: B

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

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

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

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

D. none of these

Answer: B

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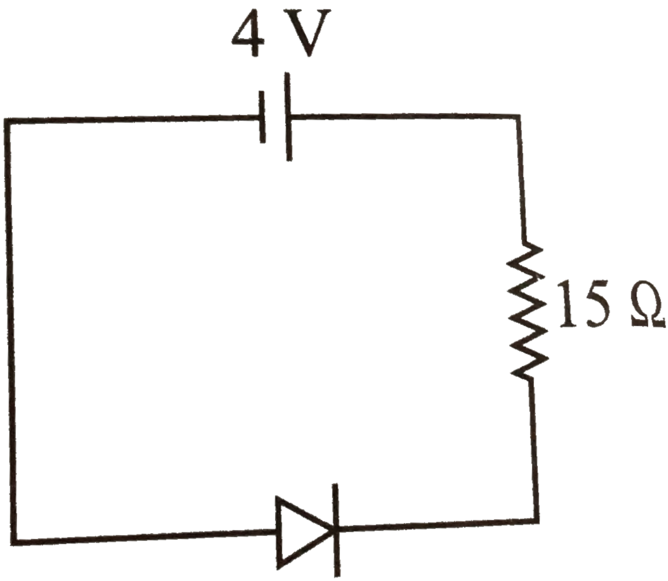

32.

In the circuit shown if current for the diode is $20\mu A$, the potential difference across the diode is

A. 2 V

B. 4.5V

C. 4 V

D. 2.5 V

Answer: C

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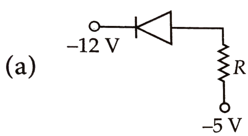
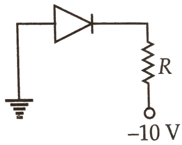
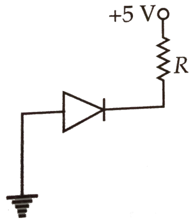
33. Of the diodes shown in the following figures, which one is reverse biased ?

A. 

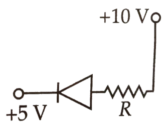
B. (b)



C. (c)



D. (d)



Answer: C

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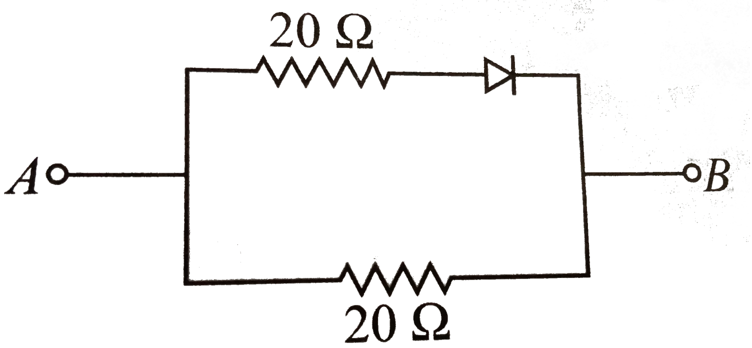
34. The equivalent resistance of the circuit shown in figure between the points A and B if

$V_A < V_B$ is



A. 10Ω

B. 20Ω

C. 5Ω

D. 40Ω

Answer: B

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35. The equivalent resistance between the points A and B, if $V_A > V_B$ is

A. 10Ω

B. 20Ω

C. 30Ω

D. 15Ω

Answer: A

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36. The following table provides the set of values of V and I obtained for a given diode. Let the characteristics α be nearly linear, over this range, the forward and reverse bias resistance of the given diode respectively are

	V	I
Forward biasing	2.0 V	60 mA
	2.4 V	80 mA
Reverse biasing	0 V	0 μA
	–2 V	–0.25 μA

A. $10\Omega, 8 \times 10^6\Omega$

B. $20\Omega, 4 \times 10^5\Omega$

C. $20\Omega, 8 \times 10^6\Omega$

D. $10\Omega, 10\Omega$

Answer: C

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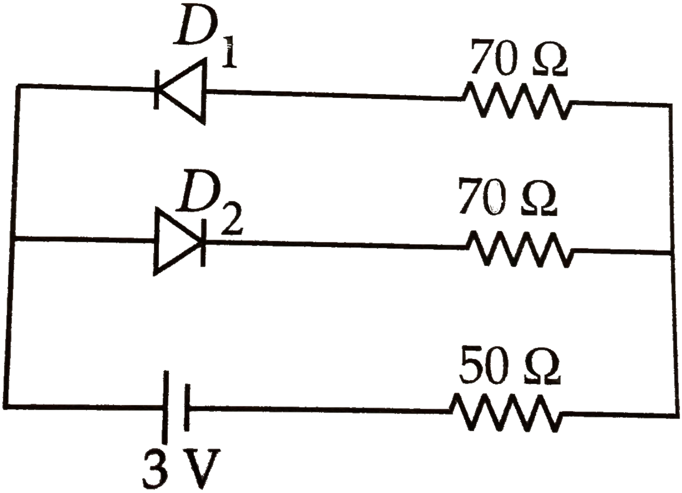
37. The circuit shown in the figure contains two diodes each with a forward resistance of 30 Ω and with infinite backward resistance. If the battery is 3 V, the current through the 50

Ω resistance (in ampere) is



A. zero

B. 0.01

C. 0.02

D. 0.03

Answer: C

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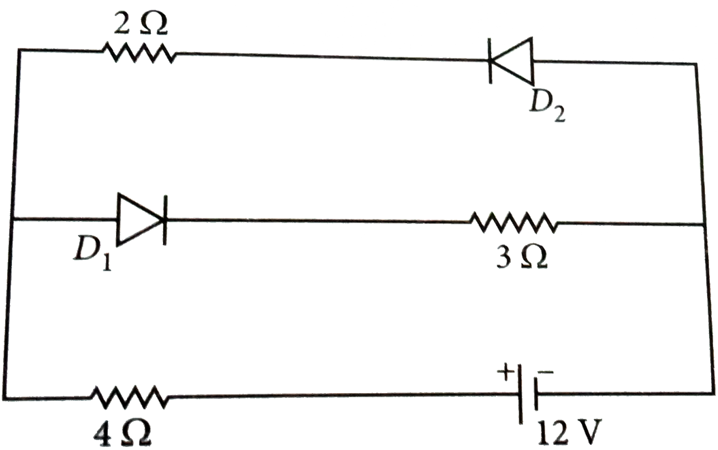
38. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?



A. 2.0A

B. 1.33 A

C. 1.71 A

D. 2.31 A

Answer: C

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

A. 50 Hz in the dc output of half wave as well as full wave rectifier

B. 100 Hz in the dc output of half wave as well as full wave rectifier

C. 50 Hz in the dc output of half wave and 100 Hz in dc output of full wave rectifier

D. 100 Hz in the dc output of half wave and 50 Hz in the dc output of full wave rectifier

Answer: C

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

A. 12 V

B. 24 V

C. 36 V

D. 42 V

Answer: C

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

A. 25 Hz

B. 50 Hz

C. 70.7 Hz

D. 100 Hz

Answer: B

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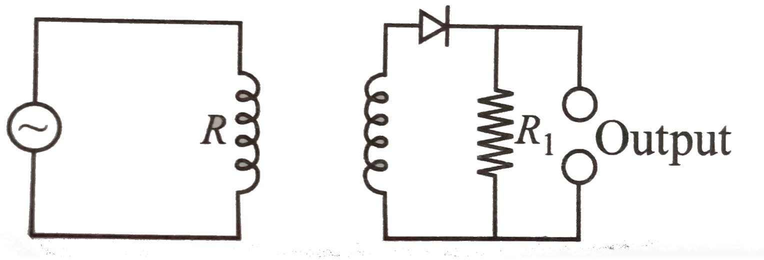
42. A sinusoidal voltage of rms value 220 V is applied to a diode and a resistor R in the circuit shown in figure so that half wave rectification occurs. If the diode is ideal, what is the rms voltage across R_1?



A. $55\sqrt{2}$ V

B. 110 V

C. $110\sqrt{2}$ V

D. $220\sqrt{2}$ V

Answer: D

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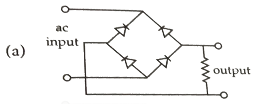
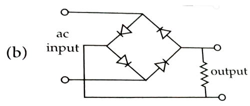
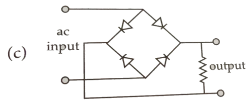
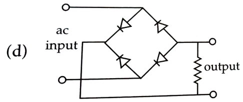
43. Which of the following circuits provides full wave rectification of an ac input?

A. 

B. 

C. 

D. 

Answer: D

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

A. The current through the series resistance (R_S) changes

B. The resistance offered by the Zener changes

C. The Zener resistance is constant.

D. Both (a) and (b)

Answer: D

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45. A Zener diode is specified having a breakdown voltage of 9.1 V with a maximum power dissipation of 364 mW. What is the maximum current that the diode can handle.

A. 40 mA

B. 60 mA

C. 50 mA

D. 45 mA

Answer: A

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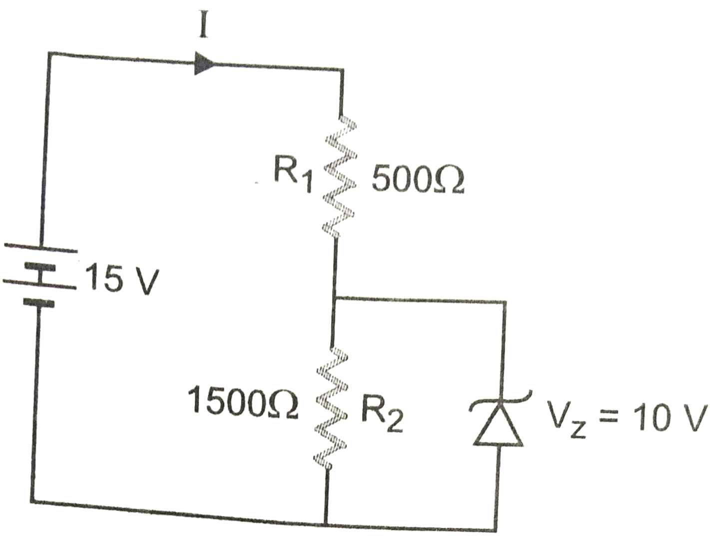
46. In the circuit, Fig The current through the zener diode is



A. 10 mA

B. 6.67 mA

C. 5 mA

D. 3.33 mA

Answer: D

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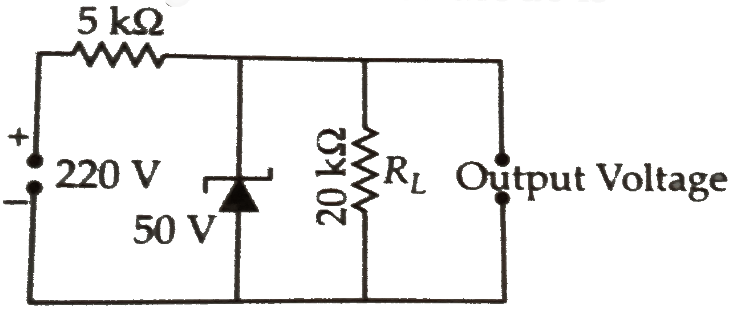
47. From the Zener diode circuit shown in figure, the current through the Zener diode is



A. 34 mA

B. 31.5 mA

C. 36.5 mA

D. 2.5 mA

Answer: B

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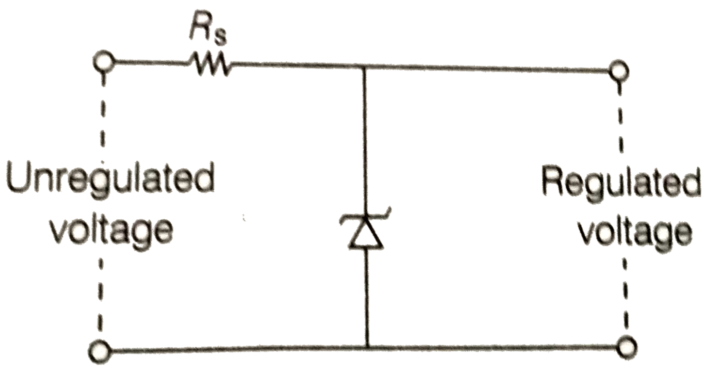
48. A Zener of power rating 1 W is to be used as a voltage regulator. If Zener has a breakdown of 5V and it has to regulate voltage which fluctuated between 3 V and 7 V, what should be the value of R_s for safe operation (see figure) ?



A. 5Ω

B. 10Ω

C. 15Ω

D. 20Ω

Answer: B

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

(hc= 1240 eV nm)

A. 1×10^{14} Hz

B. 20×10^{14} Hz

C. 10×10^{14} Hz

D. 5×10^{14} Hz

Answer: D

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

A. 6000 Å

B. 6000 nm

C. 4000 nm

D. 4000 Å

Answer: D

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

A. D_1

B. D_2

C. D_3

D. D_1 and D_2 are both

Answer: B

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52. The transfer characteristics of a base biased transistor has the operation regions, namely, cutoff, active region and saturation region. For using the transistor as an amplifier it has to operate in the

A. active region

B. cutoff region

C. saturation region

D. cutoff and saturation

Answer: A

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53. The emitter of transistor is doped the heaviest because it

A. acts as a supplier of charge carriers

B. dissipates maximum power

C. has a larger resistance

D. has a small resistance

Answer: A

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54. The heavily and lightly doped regions of a bipolar junction transistor are respectively

A. base and emitter

B. base and collector

C. emitter and base

D. collector and emitter

Answer: C

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55. For a transistor amplifier, the voltage gain

A. remains constant for all frequencies

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

C. is low at high and low frequencies and constant at mid frequencies

D. none of these

Answer: C

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56. An oscillator is nothing but an amplifier with

A. larger gain

B. positive feedback

C. no feedback

D. negative feedback

Answer: B

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57. The current amplification factor α of a common base transistor and the current amplification factor $\beta$of a common emitter transistor are not related by

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

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

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

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

Answer: D

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58. If β, R_L and r are the ac current gain, load resistance and the input resistance of a transistor respectively in CE configuration, the voltage and the power gains respectively are

A. $\beta\frac{R_L}{r}$ and $\beta^2\frac{R_L}{r}$

B. $\beta\frac{r}{R_L}$ and $\beta^2\frac{r}{R_L}$

C. $\beta\frac{R_L}{r}$ and $\beta\left(\frac{R_L}{r}\right)^2$

D. $\beta\frac{r}{R_L}$ and $\beta\left(\frac{r}{R_L}\right)^2$

Answer: A

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59. If α and β are the current gain in the CB and CE configurations respectively of the transistor circuit, then $\frac{\beta - \alpha}{\alpha\beta} =$

A. zero

B. 1

C. 2

D. 5

Answer: B

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60. A transistor has a current amplification factor (current gain) of 50. In a common emitter amplifier circuit, the collector resistance is chosen as 5Ω and the input resistance is 1Ω. The output voltage if input voltage is 0.01 V is

A. -2 V

B. $-5V$

C. -2.5 V

D. -1 V

Answer: C

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61. Two amplifiers are connected one after the other in series (cascaded). The first amplifier has a voltage gain of 10 and the second has a voltage gain of 20 . If the input signal is 0.01 V , calculate the output AC signal .

A. 4V

B. 1V

C. 2V

D. 6 V

Answer: C

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62. The amplifiers X, Y and Z are connected in series. If the voltage gains of X, Y and Z are $10, 20$ and 30, respectively and the input signal is $1 mV$ peak value, then what is the output signal voltage (peak value)

(i) if dc supply voltage is 10V ?

(ii) if dc supply voltage is 5V?

A. 4V

B. 5 V

C. 6 V

D. 7 V

Answer: C

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63. what is the output signal voltage (peak value) if dc supply voltage is 5 V?

A. 4 V

B. 5 V

C. 6 V

D. 7 V

Answer: B

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64. In n-p-n transistor circuit, the collector current is $10 mA$. If 90% of the holes reach the collector, find emitter and base currents.

A. 10 mA, 1 mA

B. 22 mA,11 mA

C. 11 mA, 1 mA

D. 20 mA, 10 mA

Answer: C

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65. A transistor connected in common emitter mode, the voltage drop across the collector is 2 V and β is 50, the base current if R_C is $2k\Omega$ is

A. $40\mu A$

B. $20\mu A$

C. $30\mu A$

D. $15\mu A$

Answer: B

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66. The power gain for common base amplifier is 800 and the voltage amplification factor is 840. The collector current when base current is 1.2 mA is

A. 24 mA

B. 12 mA

C. 6 mA

D. 3 mA

Answer: A

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67. The current gain for a common emitter amplifier is 69. If the emitter current is 7 mA, the base current is

A. 0.1 mA

B. 1 mA

C. 0.2 mA

D. 2 mA

Answer: A

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68. The potential difference across the collector of a transistor, used in common emitter mode is 1.5 V, with the collector resistance of $3k\Omega$, the emitter current is [$\beta = 50$]

A. 0.70mA

B. 0.51 mA

C. 1.1 mA

D. 1.9 mA

Answer: B

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69. In a common -emitter transistor amplifier, an increase of $50\mu A$ in the base current causes an increase of $1.0mA$ in the collector current . Calculat gain β. What will be the change in emitter current? Also calculate current gain α

A. 1050 mA

B. 1050 μA

C. 5025 mA

D. 5025 μA

Answer: B

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70. For a common emitter transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 2 V. Suppose the current amplification factor of the transistor is 100, the base current if base resistance is $1k\Omega$ is

A. $10\mu A$

B. $20\mu A$

C. $5\mu A$

D. $2\mu A$

Answer: A

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71. The ac current gain of a transistor is 120. What is the change in the collector current in the transistor whose base current changes by $100\mu A$?

A. 6 mA

B. 12 mA

C. 3 mA

D. 24 mA

Answer: B

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72. In an n-p-n circuit transistor, the collector current is 10 mA. If 80% electrons emitted reach the collector, then

A. the emitter current will be 7.5 mA

B. the emitter current will be 12.5 mA

C. the base current will be 3.5 mA

D. the base current will be 1.5 mA

Answer: B

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

A. $3k\Omega$

B. $30k\Omega$

C. $1k\Omega$

D. $5k\Omega$

Answer: A

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74. The input resistance of a common emitter transistor amplifier, if the output resistance is $500k\Omega$, the current gain $\alpha = 0.98$ and the power gain is 6.0625×10^6 is

A. 198Ω

B. 300Ω

C. 100Ω

D. 400Ω

Answer: A

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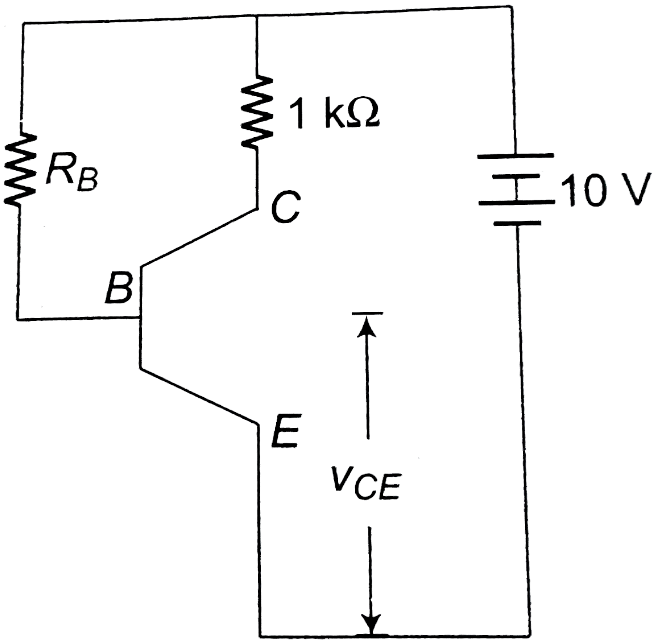
75. In the cuircuit shown here the transistor used has a current gain $\beta = 100$. What should be the bias resistor R_{BE} so that

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



A. $200 \times 10^3\Omega$

B. $1 \times 10^6\Omega$

C. 500Ω

D. $2 \times 10^3\Omega$

Answer: A

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76. The input resistance of a transistor is 1000Ω on charging its base current by $10\mu A$, the collector current increases by 2 mA. If a load resistance of $5k\Omega$ is used in the circuit, the voltage gain of the amplifier is

A. 100

B. 500

C. 1000

D. 1500

Answer: C

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

A. 90

B. 180

C. 45

D. 360

Answer: B

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78. In a transistor connected in a common emitter mode $R_C = 4k\Omega, R_1 = 1k\Omega, I_C = 1mA$ and $I_B = 20\mu A$. Find the voltage gain.

A. 100

B. 200

C. 300

D. 400

Answer: B

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79. 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. 0.02

B. 7

C. 33

D. 49

Answer: A

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80. 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. 50

B. 100

C. 200

D. 150

Answer: B

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81. What is the voltage gain in a common emitter amplifier, where input resistance is 3Ω and load resistance 24Ω and $\beta = 61$?

A. 8.4

B. 488

C. 240

D. 0

Answer: B

82. An amplifier has a voltage gain of 100. The voltage gain in dB is

A. 20 dB

B. 40 dB

C. 30 dB

D. 50 dB

Answer: B

83. 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 of 5mA to 10 mA. The current gain is

A. 100

B. 150

C. 75

D. 50

Answer: D

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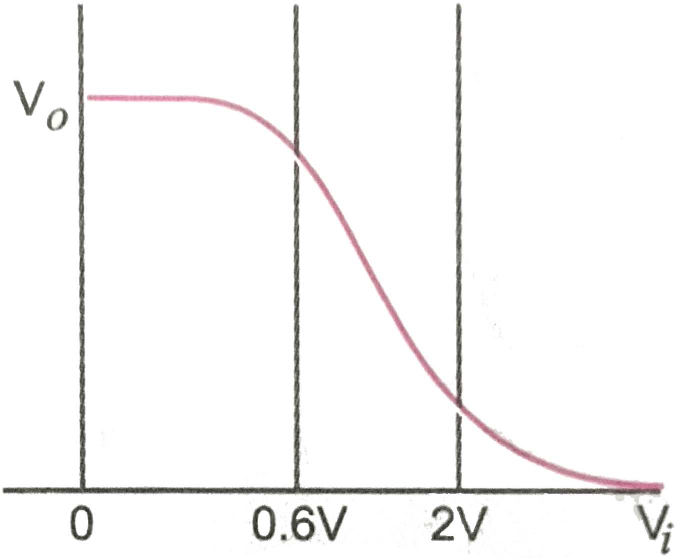
84. Fig.shows that transfer characteristics of a base biased CE transistor. Which of the following statements are true?



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

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

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

D. All of these

Answer: D

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85. Boolean algebra is essentially based on

A. number

B. truth

C. logic

D. symbol

Answer: C

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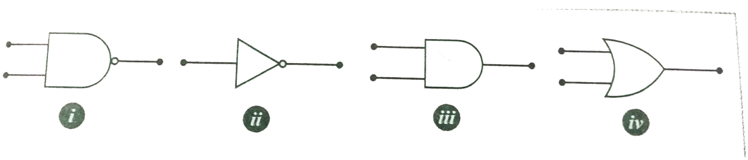
86. The symbolic representation of four logic gates are given in Fig.The logic symbol for OR, NOT and NAND gates are respectively



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

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

C. (i), (ii), (iv)

D. (ii), (iv), (i)

Answer: B

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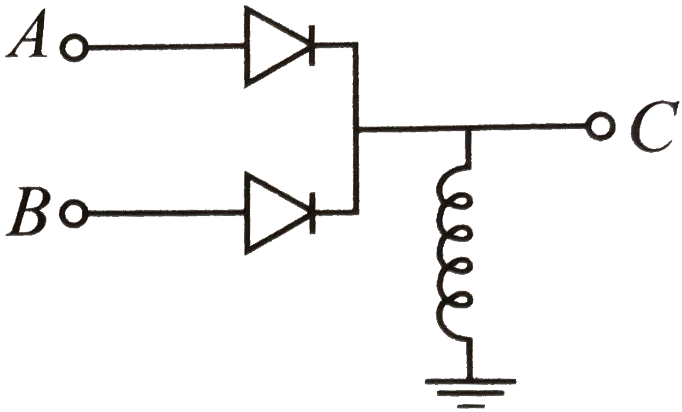
87. In the circuit below, A and B represents two inputs and C represents the output . The circuit represents



A. AND gate

B. NOR gate

C. OR gate

D. NAND gate

Answer: C

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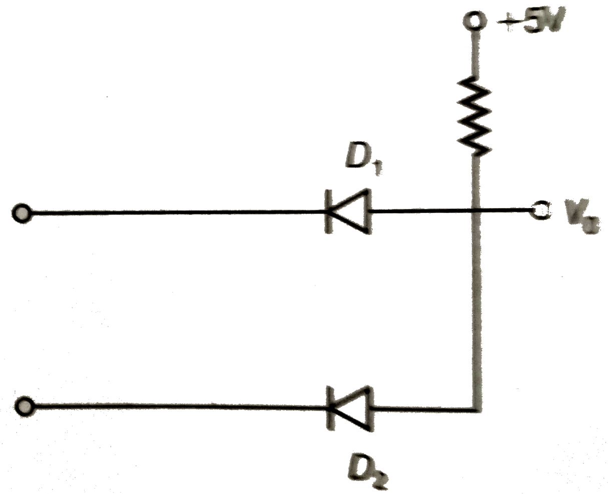
88. Write the truth table for the circuit shown in figure given below. Name the gate that the circuit resembles.



A. NAND

B. AND

C. OR

D. NOR

Answer: B

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89. In boolean algebra, if $A = 1$ and $B = 0$ then the value of $A + \overline{B}$ is

A. A

B. A.B

C. A+B

D. Both (a) and (c)

Answer: D

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90. 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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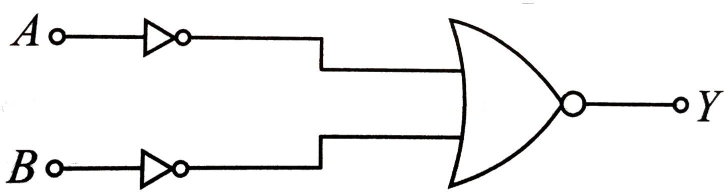
91. The circuit given in figure, is equivalent to



A. AND gate

B. OR gate

C. NOT gate

D. NAND gate

Answer: A

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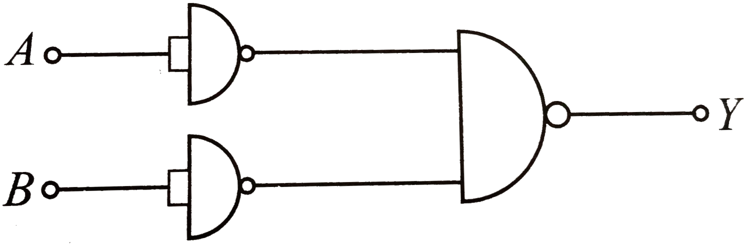
92. The combination of NAND gates is shown in figure.The equivalent circuit is



A. AND gate

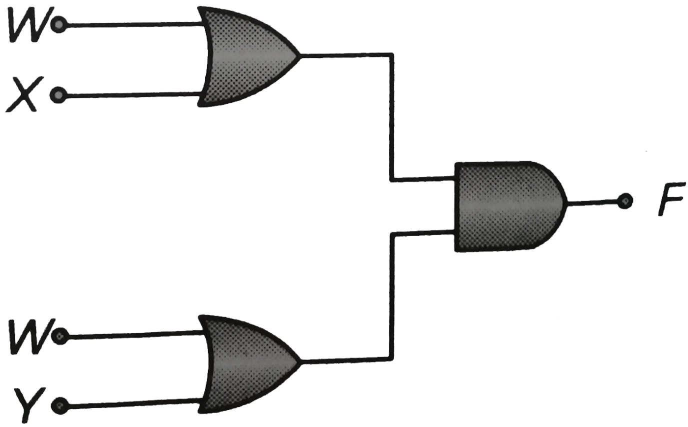
B. NOR gate

C. OR gate

D. NOT gate

Answer: C

93. The diagram of a logic circuit is given below. The output F of the circuit is represented by



A. W.(X+Y)

B. W.(X.Y)

C. W+(X.Y)

D. W+(X+Y)

Answer: C

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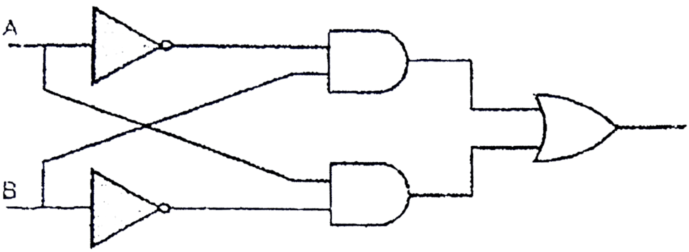
94. 

The truth table of the logic circuit shown-

A. (a)

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

B. (b)

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

C. (c)

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

D. (d)

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

Answer: A

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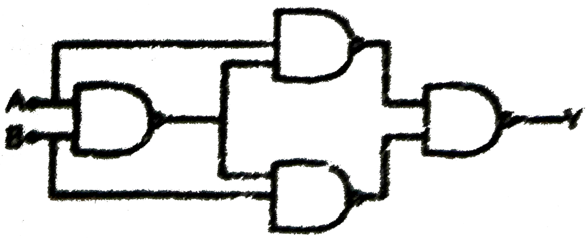
95. Select the outputs Y of the combination of gates shown below for inputs $A=1, B=0, A=1, B=1$ and $A=0, B=0$ respectively :-



A. (0,1,1)

B. (1,0,1)

C. (1,1,1)

D. (1,0,0)

Answer: D

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96. The given truth table is for which

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

A. NAND

B. XOR

C. NOR

D. OR

Answer: A

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97. Which of the following truth tables corresponds to NAND gate ?

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

(i)

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

(ii)

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

(iii)

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

(iv)

(a) (iv) (b) (iii) (c) (ii) (d) (i)

A. (iv)

B. (iii)

C. (ii)

D. (i)

Answer: D

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98. The decimal equivalent of the binary number $(11010.101)_2$ is

A. 9.625

B. 25.265

C. 26.625

D. 26.265

Answer: D

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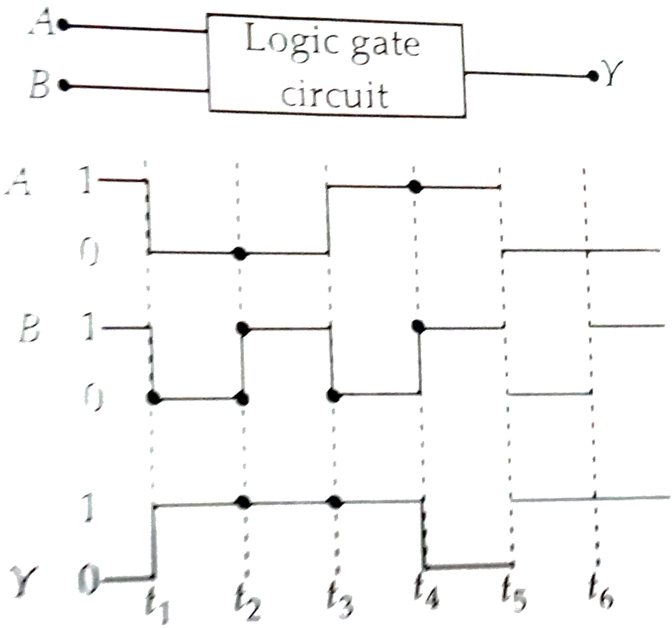
99. The following figure shows a logic gate circuit with two inputs A and B and the output Y. The voltage waveforms of A,B and Y are as given :



The logic gate is

A. NOR gate

B. OR gate

C. AND gate

D. NAND gate

Answer: D

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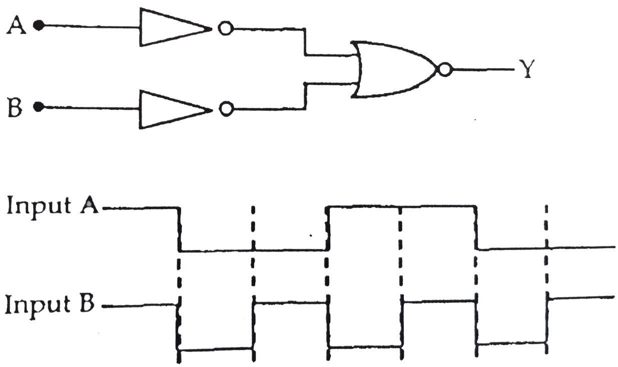
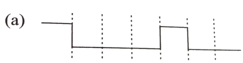
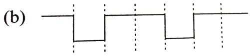
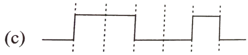
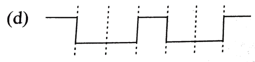
100. The logic circuit shown below has the input waveforems 'A' and 'B' as shown. Pick out the correct output waveform



A. 

B. 

C. 

D. 

Answer: A

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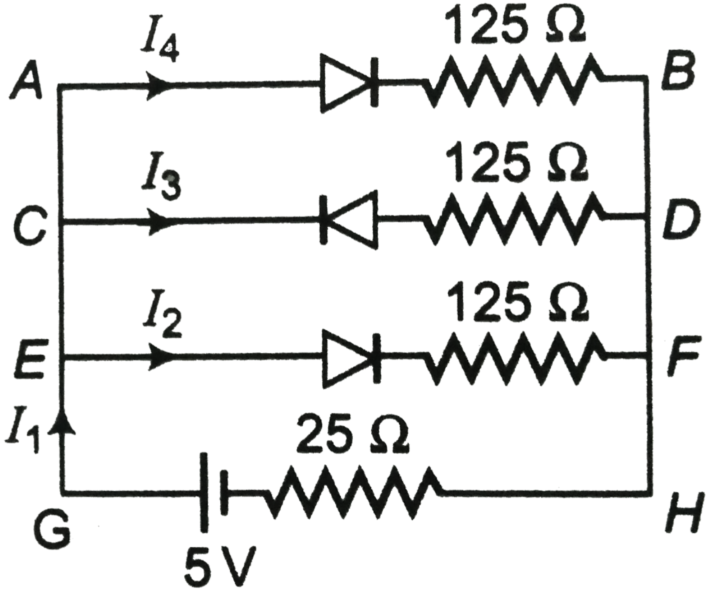
Hots

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



A. $I_2 = 0.40A, I_4 = 0.025A$

B. $I_2 = 0.25A, I_4 = 0.20A$

C. $I_1 = 0.05A, I_3 = 0.02A$

D. $I_2 = I_4 = 0.025A$

Answer: D

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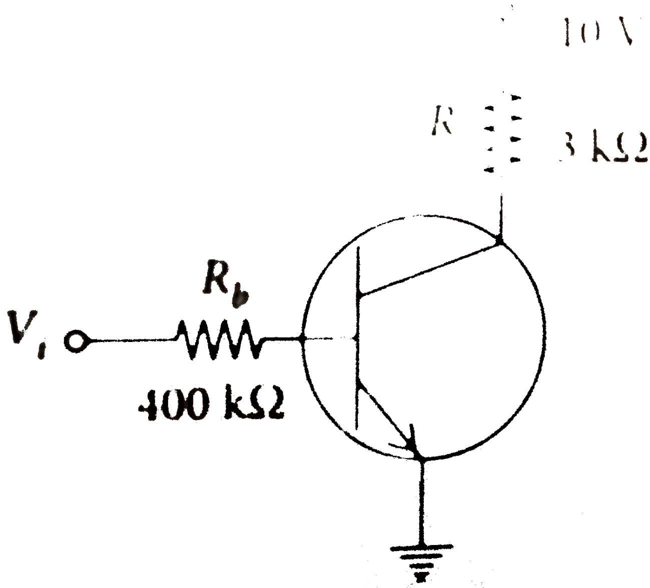
2. In the circuit shown in figure, when the input voltage of the base resistance is 10 V, V_{be}

is zero and V_{ce} is also zero. Then



A. $\beta = 110$

B. $I_b = 25\mu A$

C. $I_c = 3.33mA$

D. both (A) and (C)

Answer: D

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3. 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. 10^6 V/m

B. 10^7 V/m

C. 10^5 V/m

D. 10^4 V/m

Answer: A

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4. If an electron approaches the p-n junction from the n-side with a speed of $5 \times 10^5 ms^{-1}$,with what speed will it enter the p-side?

A. 5×10^5 m/s

B. 2.5×10^6 m/s

C. 2.7×10^5 m/s

D. 1×10^5 m/s

Answer: C

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5. An n-p-n transistor in a common-emitter mode is used as a simple voltage-amplifier with a collector current of 4 mA. The terminals of a 8 V battery is connected to the collector through a load-resistance R_L and to the base through a resistance R_B. The collector-emitter voltage $V_{CE} = 4V$, the base-emitter voltage $V_{BE} = 0.6V$ and the current amplification factor $\beta_{dc} = 100$. Then

A. $R_L = 1k\Omega, R_B = 185k\Omega$

B. $R_L = 2k\Omega = R_B$

C. $R_L = 2k\Omega, R_B = 15k\Omega$

D. $R_L = 185k\Omega, R_B = 1k\Omega$

Answer: A

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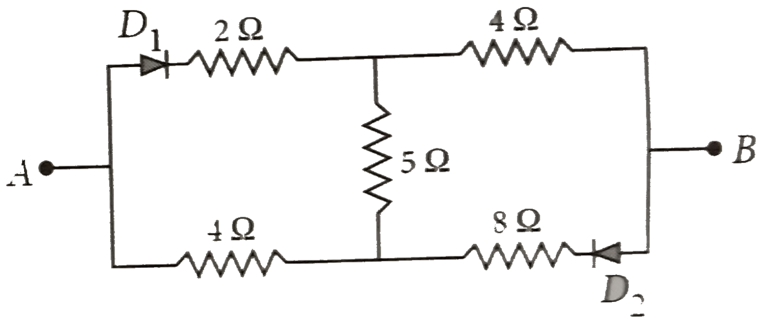
6. The equivalent resistance of the circuit, across AB is given by



A. 6.2Ω

B. 5.64Ω

C. 8.2Ω

D. 5.6Ω or 8.2Ω

Answer: D

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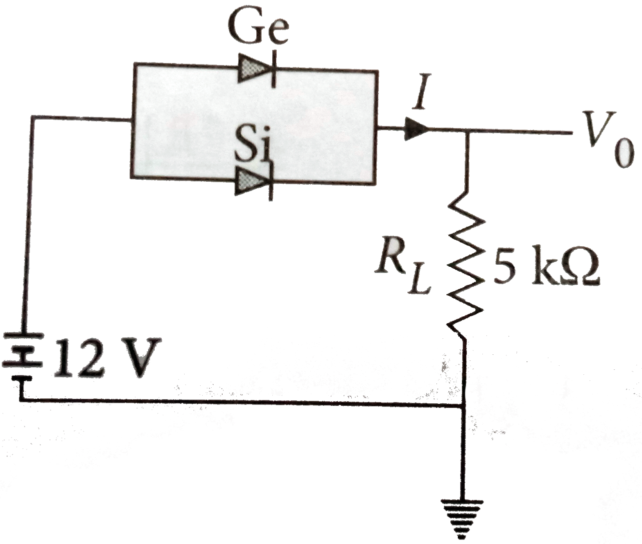
7. In the circuit shown in figure, the silicon and germanium diodes start conducting at 0.7 V and 0.3 V respectively. What are the values of

V_0 and I?



A. 12 V, 2.4 mA

B. 11.7 V, 2.34 mA

C. 11.3 V, 2.26 mA

D. 11 V, 2.2 mA

Answer: B

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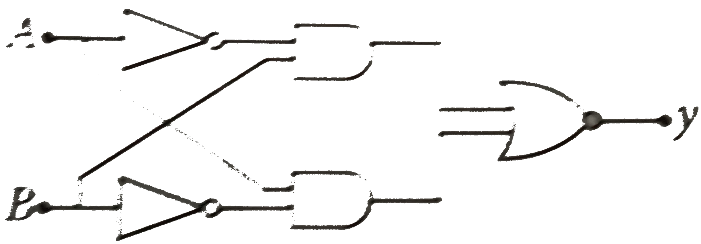
8. The Boolean expression of the output y in terms of the input A and B for the circuit shown in figure.



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

B. AB

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

D. $A\overline{B} + 1$

Answer: C

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Ncert

1. The conductivity of a semiconductor increases with increase in temperature because

A. number density of free current carriers increases

B. relaxation time increases.

C. both number density of carriers and relaxation time increase

D. number density of current carriers increases, relaxation time decreases but effect of decrease in relaxation time is much less than increase in number density

Answer: D

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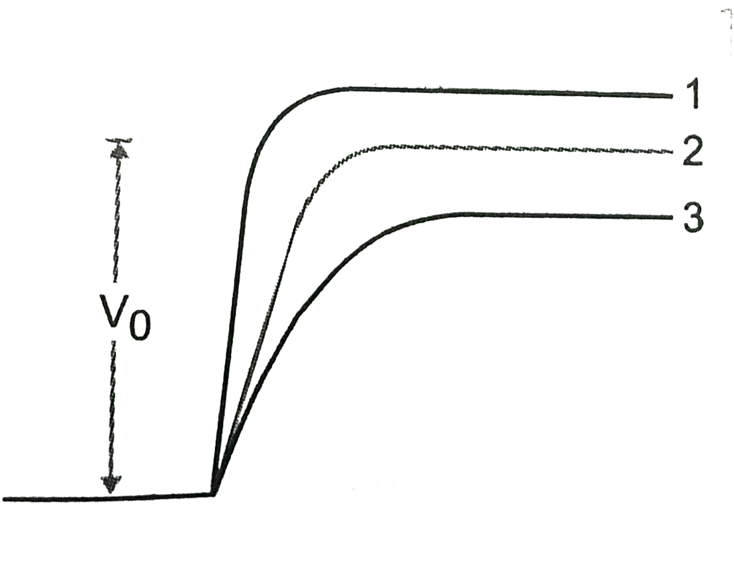
2. In Fig . V_0 is the potential barrier across a p-n junction, when no battery is connected across the junction



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

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

Answer: B

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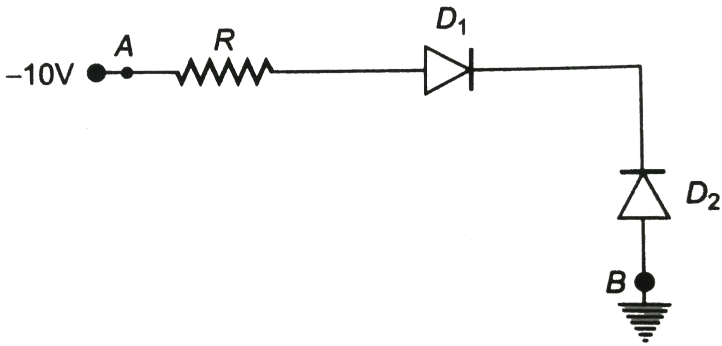
3. In figure , assuming the diodes to be ideal ,



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

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

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

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

Answer: B

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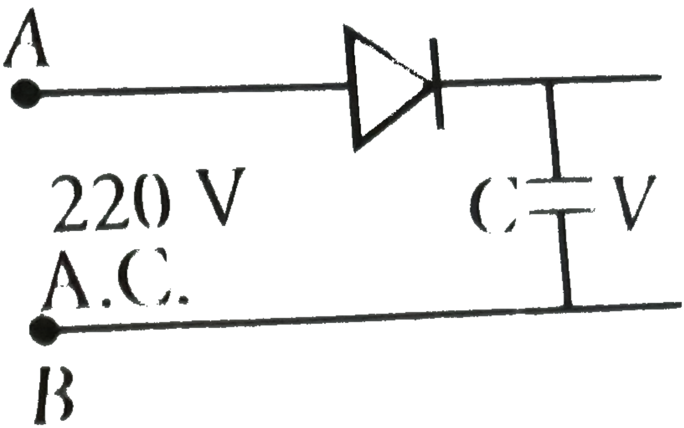
4. A 220 V ac supply is connected between points A and B as shown 220 V in figure. What will be the potential AC difference V across the capacitor?



A. 220 V

B. 110 V

C. 0 V

D. $200\sqrt{2}V$

Answer: D

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5. Hole is

A. an anti-particle of electron

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

C. absence of free electrons.

D. an artificially created particle.

Answer: B

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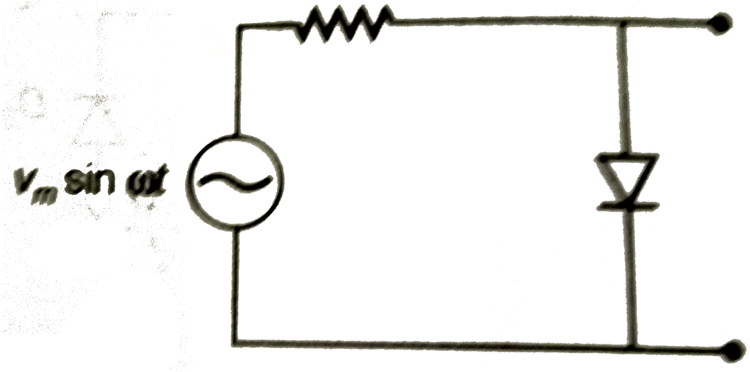
6. The output of the given circuit in figure given below,



A. would be zero at all times.

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

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

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

Answer: C

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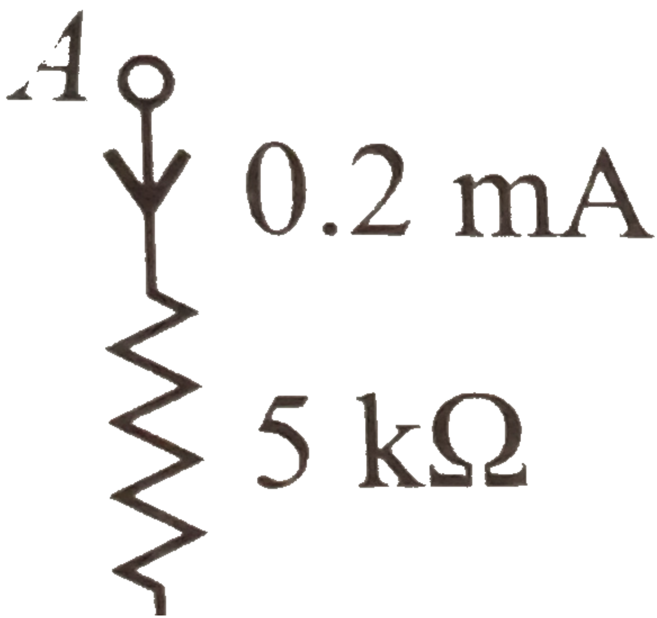
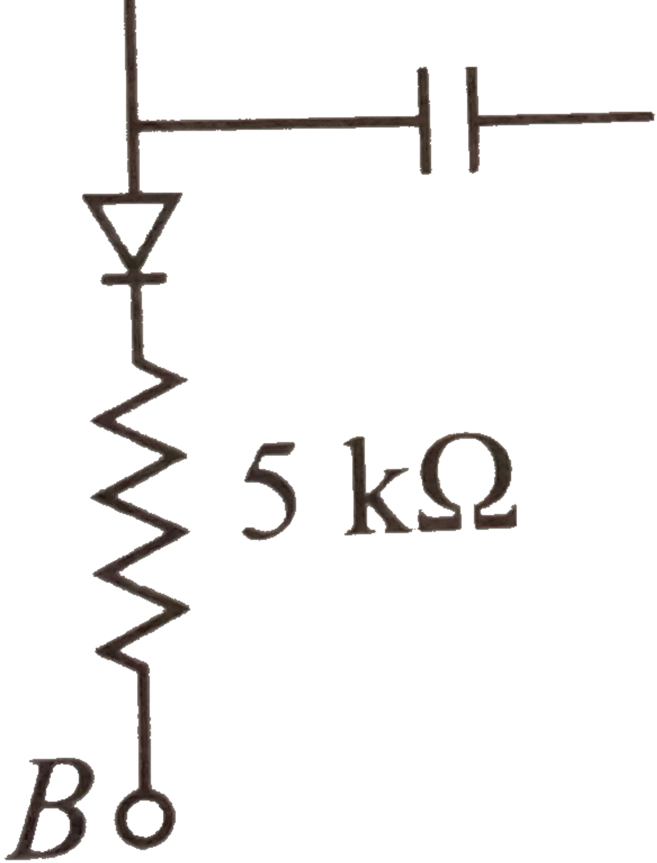
7. In the circuit shown in figure, if the A diode forward voltage drop is 0.3 V, the voltage difference between A and B is





A. 1.3 V

B. 2.3 V

C. 0

D. 0.5 V

Answer: B

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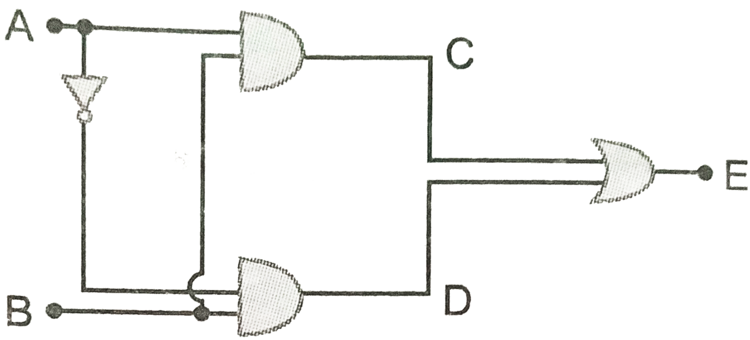
8. Truth table for the given circuit (Fig.)is



A. (a)

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

B. (b)

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

C. (c)

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

D. (d)

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

Answer: C

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Assertion Reason

1. Assertion: If there is some gap between the conduction band and the valence band, electrons in the valence band all remain bound and no free electrons are available in the conduction band. Then the material is an insulator.

Reason: Resistance of insulators is very low

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

assertion.

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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2. Assertion : The electrons in the conduction band have higher energy than those in the valence band of a semiconductor

Reason : The conduction band lies above the energy gap and valence band lies below the energy gap.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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3. Assertion : In a semiconductor, the conduction electrons have a higher mobility than holes.

Reason: The electrons experience fewer collisions.

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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4. Assertion: The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature decrease exponentially with increasing band gap.

Reason: It will be more difficult for the electron to cross over the large band gap while going from valence band to conduction band.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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5. Assertion: The conductivity of an intrinsic semiconductor depends on its temperature.

Reason The conductivity of an intrinsic semiconductor is slightly higher than that of a lightly doped p-type semiconductor.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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6. Assertion: The conductivity of an intrinsic semiconductor depends on its temperature

Reason: No important electronic devices can be developed using intrinsic semiconductors.

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

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7. Assertion: Thickness of depletion layer is fixed in all semiconductor devices.

Reason: No free charge carriers are available in deplection layer.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: D

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8. Assertion: Zener diode works on aa principle of of breakdown voltage.

Reason: Current increases suddenly after breakdown voltage.

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

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9. Assertion : Zener diode is used to obtain voltage regulation

Reason : When Zener diode is operated in reverse bias, after a certain voltage (breakdown voltage) the current suddenly increases.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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10. Assertion: The semiconductor used for fabrication of visible LEDs must at least have a band gap of 1.8 eV.

Reason: The spectral range of visible light is 0.4 eV to 1.8 eV

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

assertion.

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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11. Assertion : In a transistor the base is made thin.

Reason: A thin base makes the transistor stable.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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12. Assertion : Two p-n junction diodes placed back to back, will work as a n-p-n transistor.

Reason: The p-region of two p-n junction diodes back to back will form the base of n-p-n transistor.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: D

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13. Assertion : In an oscillator, the feedback is in the same phase which is called as positive feedback.

Reason: If the feedback voltage is in opposite phase, the gain is greater than one.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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14. Assertion : In an OR gate if any of the input is high, the output is high.

Reason: OR gate is the most basic gate, with one input and one output

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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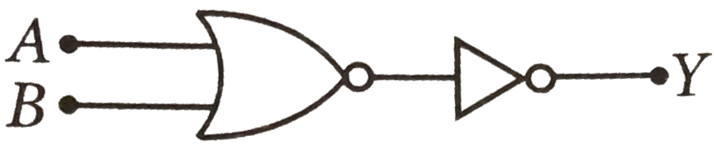
15. Assertion:



This circuit acts as OR Gate.

Reason: Truth table for two input OR Gate is

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

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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Classification Of Metals Conductors And Semiconductors

1. At absolute zero , Si acts as

A. metal

B. semiconductor

C. insulator

D. none of these

Answer: C

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2. In good conductors of electricity, the type of bonding that exists is

A. Van der Waals

B. covalent

C. ionic

D. metallic

Answer: D

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

A. Heisenberg uncertainty principle

B. Pauli's exclusion principle

C. Bohr's correspondence principle

D. Boltzmann law

Answer: B

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4. Carbon , silicon and germanium have four valence elcectrons 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 ture ?

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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5. If the energy of a photon of sodium light (λ =589 nm) equals the band gap of semiconductor, the minimum energy required to create hole electron pair

A. 1.1 eV

B. 2.1 eV

C. 3.2 eV

D. 1.5 eV

Answer: B

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6. 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.

A. 0.9

B. 0.7

C. 0.5

D. 1.1

Answer: C

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7. Find the wavelength of light that may excite an electron in the valence band of diamond to the conduction band. The energy gap is 5.50 eV

A. 226 nm

B. 312 nm

C. 432 nm

D. 550 nm

Answer: A

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8. The maximum wavelength of electromagnetic radiation, which can create a hole-electron pair in germanium. (Given that forbidden energy gap in germanium is 0.72 eV)

A. 1.7×10^{-6} m

B. 1.5×10^{-5} m

C. 1.3×10^{-4} m

D. 1.9×10^{-5} m

Answer: A

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Intrinsic Semiconductor

1. The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature

A. increases exponentially with increasing band gap

B. decreases exponentially with increasing band gap

C. decreases with increasing temperature.

D. is independent of the temperature and band gap.

Answer: B

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2. Which of the following equations correctly represents the temperature variation of energy gap between the conduction and valence bands for Si?

A. $E_{g(T)} = 0.70 - 2.23 \times 10^{-4}$ T eV

B. $E_{g(T)} = 0.70 + 2.23 \times 10^{-4}$ T eV

C. $E_{g(T)} = 1.10 - 3.60 \times 10^{-4}$ T eV

D. $E_{g(T)} = 1.10 + 3.60 \times 10^{-4}$ T eV

Answer: C

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3. An intrinsic semiconductor has a resistivity of 0.50 Ω m at room temperature. Find the intrinsic carrier concentration if the mobilities of electrons and holes are $0.39m^2V^{-1}s^{-1}$ and $0.11m^2V^{-1}s^{-1}$ respectively

A. $1.2 \times 10^{18}m^{-3}$

B. $2.5 \times 10^{19}m^{-3}$

C. $1.9 \times 10^{20} m^{-3}$

D. $3.1 \times 10^{21} m^{-3}$

Answer: B

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4. In pure semiconductor, the number of conduction electrons is 6×10^{18} per cubic metre. How many holes are there in a sample of size 1 cm x 1 cm x 1 mm?

A. 3×10^{10}

B. 6×10^{11}

C. 3×10^{11}

D. 6×10^{10}

Answer: B

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5. Mobilities of electorns and holes in a sample of intrinsic germanium at room temperature are $0.54m^2V^{-1}s^{-1}$ and $0.18m^2V^{-1}s^{-1}$

respectively.

If the electron and hole densities are equal to $3.6 \times 10^{19} m^{-3}$ calculate the germanium conductivity.

A. $4.14 Sm^{-1}$

B. $2.12 Sm^{-1}$

C. $1.13 Sm^{-1}$

D. $5.6 Sm^{-1}$

Answer: A

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6. A block of pure silicon at $300K$ has a length of $10cm$ and an area of $1.0cm^2$. A battery of emf $2V$ is connected across it. The mobility of electron is $0.14m^2v^{-1}S^{-1}$ and their number density is $1.5 \times 10^{16}m^{-3}$. The mobility of holes is $0.05m^2v^{-1}S^{-1}$.

The electron current is

A. 6.72×10^{-4} A

B. 6.72×10^{-5} A

C. 6.72×10^{-6} A

D. 6.72×10^{-7} A

Answer: D

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Extrinsic Semiconductor

1. In an n- type silicon, which of the following statements is true ?

(a) Electrons are majority carries and trivalent atoms are the dopants.

(b) Electrons are majority carries and pentavalent atoms are the dopants.

(c) Holes are minority carries and paentavalent atoms are the dopants.

(d) Holes are minority carries and trivalent atoms are the dopants.

A. Electrons are majority carriers and trivalent atoms are the dopants

B. Electrons are minority carriers and pentavalent atoms are the dopants

C. Holes are minority carriers and pentavalent atoms are the dopants

D. Holes are majority carriers and trivalent atoms are the dopants.

Answer: C

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

A. its resistance is increased

B. it becomes a p-type semiconductor

C. there will be more free electrons than holes in the semiconductor

D. none of these

Answer: C

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3. In n-type semiconductor when when all donor states are filled, then the net charge density in the donor states becomes

A. 1

B. gt 1

C. lt 1, but not zero

D. zero

Answer: B

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4. Suppose a pure Si-crystal has $5 \times 10^{28} \text{atoms} m^{-3}$. It is doped by 1 ppm concentration of pentavalent As. Calculate the number of electrons and holes. Give that $n_i = 1.5 \times 10^{16} m^{-3}$.

A. $4.5 \times 10^{9} m^{-3}$

B. $4.5 \times 10^{6} m^{-3}$

C. $2.5 \times 10^{9} m^{-3}$

D. $2.5 \times 10^{6} m^{-3}$

Answer: A

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5. A semiconductor has equal electron and hole concentration of $6 \times 10^8 / m^3$. On doping with certain impurity, electron concentration increases to $9 \times 10^{12} / m^3$. (i) Identify the new semiconductor obtained after doping. (ii) Calculate the new hole concentration. (iii) How does the energy gap vary with doping?

A. 2×10^4 per m^3

B. 2×10^2 per m^3

C. 4×10^4 per m^3

D. 4×10^2 per m^3

Answer: C

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6. The number density of electrons and holes in pure silicon at 27° C are equal and its value is $2.0 \times 10^{16} m^{-3}$. On doping with indium the hole density increases to $4.5 \times 10^{22} m^{-3}$, the electron density in doped silicon is

A. $10 \times 10^9 m^{-3}$

B. $8.89 \times 10^9 m^{-3}$

C. $11 \times 10^9 m^{-3}$

D. $16.78 \times 10^9 m^{-3}$

Answer: B

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P N Junction

1. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon $P-N$ junction are

A. drift in forward bias, diffusion in reverse bias

B. diffusion in forward bias, drift in reverse bias

C. diffusion in both forward and reverse bias

D. drift in both forward and reverse bias

Answer: B

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2. In an unbiased p-n junction electrons diffuse from n-region to p-region because :-

A. free electrons in the n-region attract them

B. they move across the junction by the potential difference

C. hole concentration in p-region is more as compared to n-region

D. all of these

Answer: C

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3. Region which have no free electron and holes in P-N junction is

A. x-region

B. p-region

C. depletion region

D. none of these

Answer: C

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4. In the depletion region of a diode.

A. There the mobile charges exist

B. Equal number of holes and electrons exist. making the region neutral.

C. Recombination of holes and electrons has taken place

D. None of these

Answer: A

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5. In a $p-n$ junction diode, the barrier potential opposes diffusion of

A. minority carrier in both regions only

B. majority carriers only

C. electrons in p region

D. holes in p region

Answer: B

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6. A potential barrier of 0.3 V exists across a p-n junction. If the depletion region is 1 μm wide, what is the intensity of electric field in this region?

A. $2 \times 10^5 Vm^{-1}$

B. $3 \times 10^5 Vm^{-1}$

C. $4 \times 10^5 Vm^{-1}$

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

Answer: B

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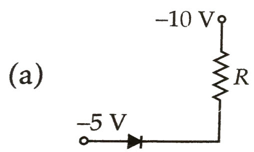
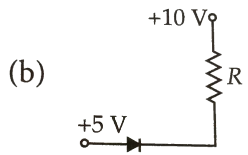
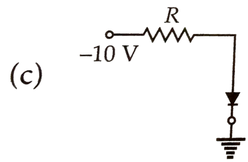
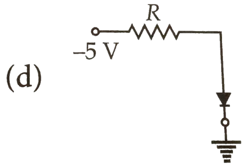
Semiconductor Diode

1. Which of the junction diodes shown below are forward biased ?

A. 

B. 

C. 

D. 

Answer: A

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2. A forward biased diode is

A. 

B. 

C. 

D. 

Answer: A

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3. When the voltage drop across a $p.n$ junction diode is increased from $0.65V$ to $0.70V$, the change in the diode current is $5mA$. What is the dynamic resistance of the diode?

A. 5Ω

B. 10Ω

C. 20Ω

D. 25Ω

Answer: B

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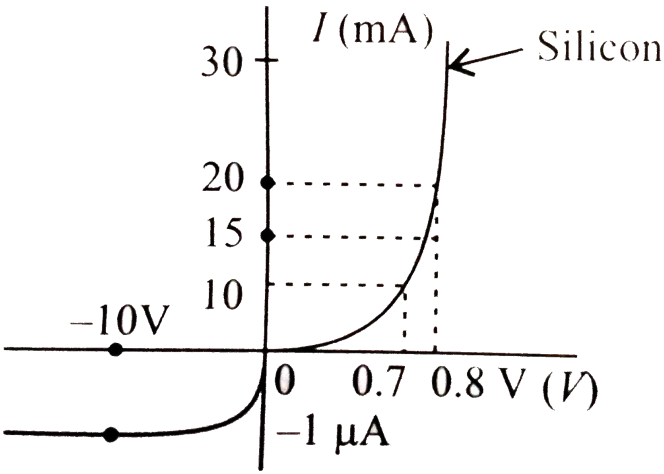
4. The V-I characteristic of a silicon diode is shown in figure . The resistance of the diode at

I_D=15 mA is



A. 5Ω

B. 10Ω

C. 2Ω

D. 20Ω

Answer: B

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

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

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

C. strong electric field in a depletion region

if the doping concentration is small

D. none of these

Answer: B

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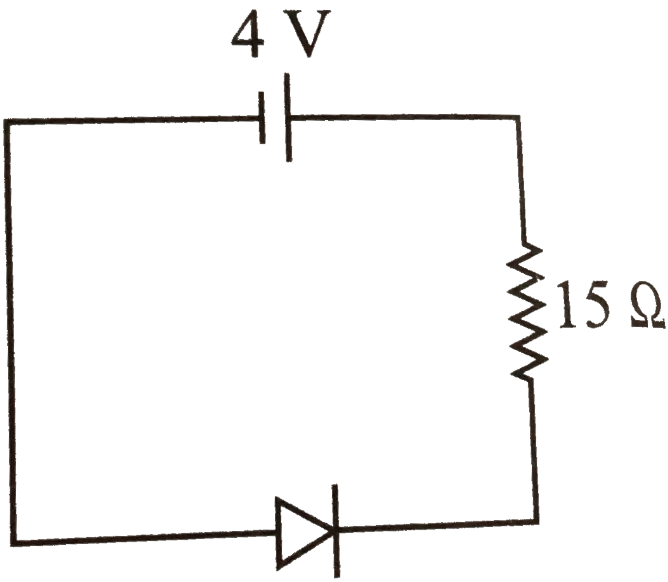
6.



In the circuit shown if current for the diode is $20\mu A$, the potential difference across the diode is

A. 2 V

B. 4.5V

C. 4 V

D. 2.5 V

Answer: C

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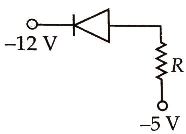
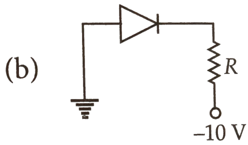
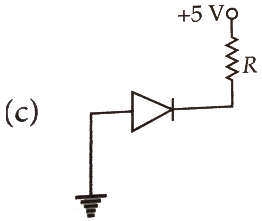
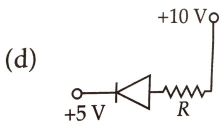
7. Of the diodes shown in the following figures, which one is reverse biased ?

A. (a)



B. 

C. 

D. 

Answer: C

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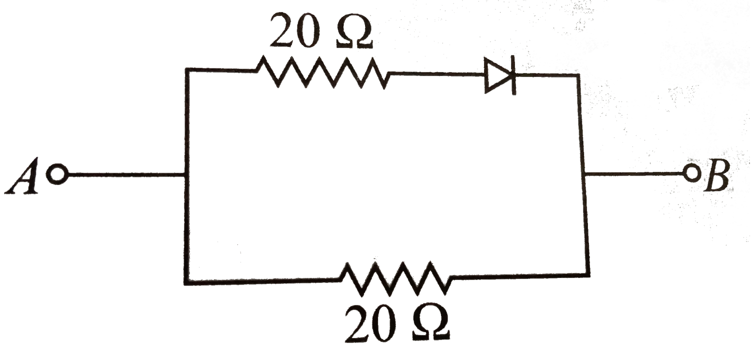
8. The equivalent resistance of the circuit shown in figure between the points A and B if

$V_A < V_B$ is



A. 10Ω

B. 20Ω

C. 5Ω

D. 40Ω

Answer: B

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9. The equivalent resistance between the points A and B, if $V_A > V_B$ is

A. 10Ω

B. 20Ω

C. 30Ω

D. 15Ω

Answer: A

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10. The following table provides the set of values of V and I obtained for a given diode. Let the characteristics α be nearly linear, over this range, the forward and reverse bias resistance of the given diode respectively are

	V	I
Forward biasing	2.0 V	60 mA
	2.4 V	80 mA
Reverse biasing	0 V	0 μA
	–2 V	–0.25 μA

A. $10\Omega,\ 8 \times 10^{6}\Omega$

B. $20\Omega,\ 4 \times 10^{5}\Omega$

C. $20\Omega, 8 \times 10^6\Omega$

D. $10\Omega, 10\Omega$

Answer: C

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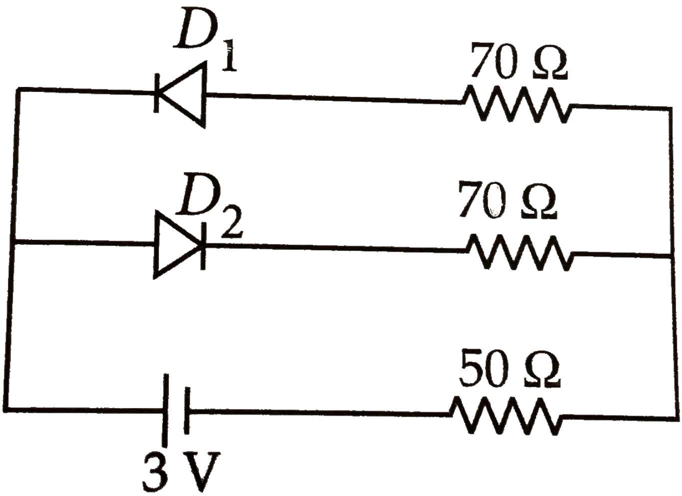
11. The circuit shown in the figure contains two diodes each with a forward resistance of 30 Ω and with infinite backward resistance. If the battery is 3 V, the current through the 50 Ω

resistance (in ampere) is



A. zero

B. 0.01

C. 0.02

D. 0.03

Answer: C

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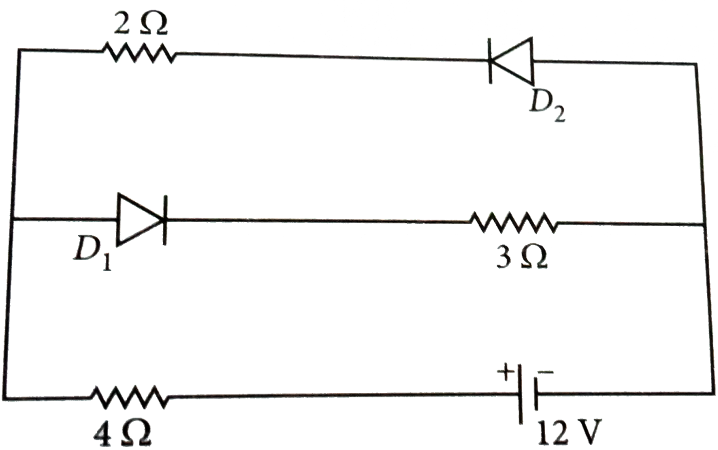
12. The circuit has two oppositely connected ideal diodes in parallel. What is the current flowing in the circuit?



A. 2.0A

B. 1.33 A

C. 1.71 A

D. 2.31 A

Answer: C

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Application Of Junction Diode As A Rectifier

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

A. 50 Hz in the dc output of half wave as well as full wave rectifier

B. 100 Hz in the dc output of half wave as well as full wave rectifier

C. 50 Hz in the dc output of half wave and 100 Hz in dc output of full wave rectifier

D. 100 Hz in the dc output of half wave and 50 Hz in the dc output of full wave rectifier

Answer: C

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

A. 12 V

B. 24 V

C. 36 V

D. 42 V

Answer: C

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

A. 25 Hz

B. 50 Hz

C. 70.7 Hz

D. 100 Hz

Answer: B

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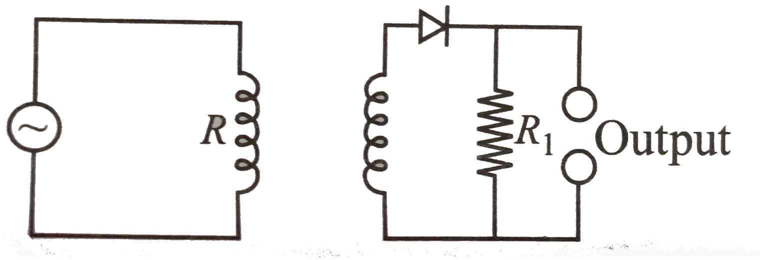
4. A sinusoidal voltage of rms value 220 V is applied to a diode and a resistor R in the circuit shown in figure so that half wave rectification occurs. If the diode is ideal, what is the rms voltage across R_1?



A. $55\sqrt{2}$ V

B. 110 V

C. $110\sqrt{2}$ V

D. $220\sqrt{2}$ V

Answer: D

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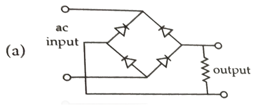
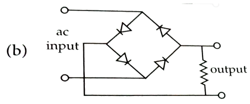
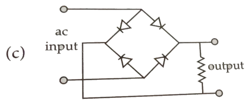
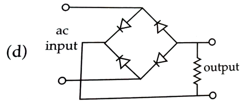
5. Which of the following circuits provides full wave rectification of an ac input?

A. 

B. 

C. 

D. 

Answer: D

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Special Purpose P N Junction Diode

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

A. The current through the series resistance (R_S) changes

B. The resistance offered by the Zener changes

C. The Zener resistance is constant.

D. Both (a) and (b)

Answer: D

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2. A Zener diode is specified having a breakdown voltage of 9.1 V with a maximum power dissipation of 364 mW. What is the maximum current that the diode can handle.

A. 40 mA

B. 60 mA

C. 50 mA

D. 45 mA

Answer: A

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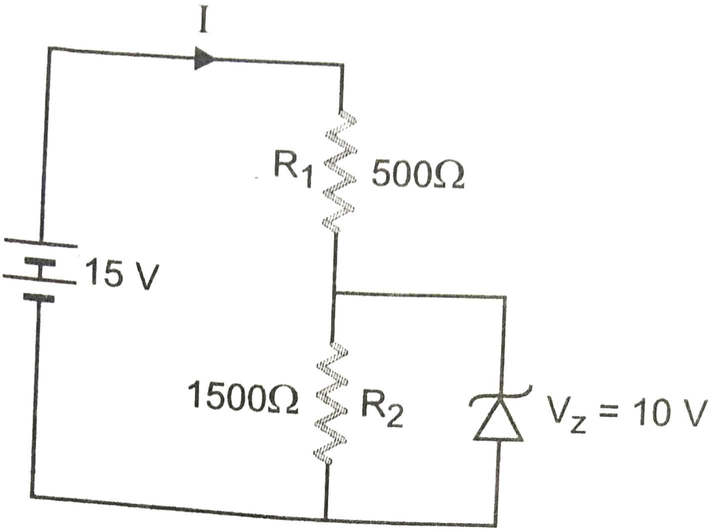
3. In the circuit, Fig The current through the zener diode is



A. 10 mA

B. 6.67 mA

C. 5 mA

D. 3.33 mA

Answer: D

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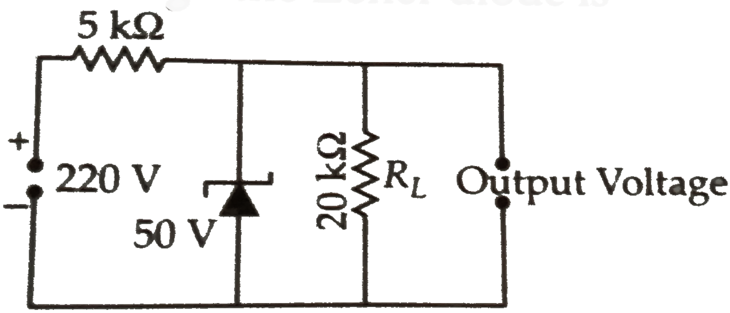
4. From the Zener diode circuit shown in figure, the current through the Zener diode is



A. 34 mA

B. 31.5 mA

C. 36.5 mA

D. 2.5 mA

Answer: B

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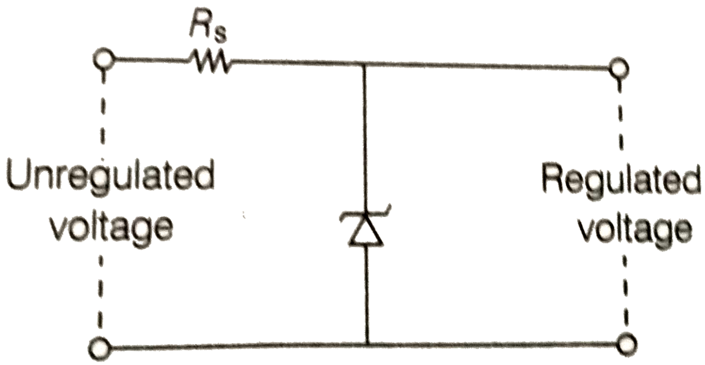
5. A Zener of power rating 1 W is to be used as a voltage regulator. If Zener has a breakdown of 5V and it has to regulate voltage which fluctuated between 3 V and 7 V, what should be the value of R_s for safe operation (see figure) ?



A. 5Ω

B. 10Ω

C. 15Ω

D. 20Ω

Answer: B

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

(hc= 1240 eV nm)

A. 1×10^{14} Hz

B. 20×10^{14} Hz

C. 10×10^{14} Hz

D. 5×10^{14} Hz

Answer: D

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

A. 6000 Å

B. 6000 nm

C. 4000 nm

D. 4000 Å

Answer: D

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

A. D_1

B. D_2

C. D_3

D. D_1 and D_2 are both

Answer: B

Watch Video Solution

Junction Transistor

1. The transfer characteristics of a base biased transistor has the operation regions, namely, cutoff, active region and saturation region. For using the transistor as an amplifier it has to operate in the

A. active region

B. cutoff region

C. saturation region

D. cutoff and saturation

Answer: A

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2. The emitter of transistor is doped the heaviest because it

A. acts as a supplier of charge carriers

B. dissipates maximum power

C. has a larger resistance

D. has a small resistance

Answer: A

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3. The heavily and lightly doped regions of a bipolar junction transistor are respectively

A. base and emitter

B. base and collector

C. emitter and base

D. collector and emitter

Answer: C

Watch Video Solution

4. For a transistor amplifier, the voltage gain

A. remains constant for all frequencies

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

C. is low at high and low frequencies and constant at mid frequencies

D. none of these

Answer: C

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5. An oscillator is nothing but an amplifier with

A. larger gain

B. positive feedback

C. no feedback

D. negative feedback

Answer: B

Watch Video Solution

6. The current amplification factor α of a common base transistor and the current amplification factor $\beta$of a common emitter transistor are not related by

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

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

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

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

Answer: D

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7. If β, R_L and r are the ac current gain, load resistance and the input resistance of a transistor respectively in CE configuration, the voltage and the power gains respectively are

A. $\beta \frac{R_L}{r}$ and $\beta^2 \frac{R_L}{r}$

B. $\beta \frac{r}{R_L}$ and $\beta^2 \frac{r}{R_L}$

C. $\beta \frac{R_L}{r}$ and $\beta \left(\frac{R_L}{r}\right)^2$

D. $\beta \frac{r}{R_L}$ and $\beta \left(\frac{r}{R_L}\right)^2$

Answer: A

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8. If α and β are the current gain in the CB and CE configurations respectively of the transistor circuit, then $\frac{\beta - \alpha}{\alpha\beta} =$

A. zero

B. 1

C. 2

D. 5

Answer: B

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9. A transistor has a current amplification factor (current gain) of 50. In a common emitter amplifier circuit, the collector resistance is chosen as 5Ω and the input resistance is 1Ω. The output voltage if input voltage is 0.01 V is

A. -2 V

B. $-5V$

C. -2.5 V

D. -1 V

Answer: C

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10. Two amplifiers are connected one after the other in series (cascaded). The first amplifier has a voltage gain of 10 and the second has a voltage gain of 20 . If the input signal is 0.01 V , calculate the output AC signal .

A. 4V

B. 1V

C. 2V

D. 6 V

Answer: C

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11. The amplifiers X, Y and Z are connected in series. If the voltage gains of X, Y and Z are $10, 20$ and 30, respectively and the input signal is $1mV$ peak value, then what is the output signal voltage (peak value)

(i) if dc supply voltage is 10V ?

(ii) if dc supply voltage is 5V?

A. 4V

B. 5 V

C. 6 V

D. 7 V

Answer: C

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12. what is the output signal voltage (peak value) if dc supply voltage is 5 V?

A. 4 V

B. 5 V

C. 6 V

D. 7 V

Answer: B

Watch Video Solution

13. In n-p-n transistor circuit, the collector current is $10 mA$. If 90% of the holes reach the collector, find emitter and base currents.

A. 10 mA, 1 mA

B. 22 mA,11 mA

C. 11 mA, 1 mA

D. 20 mA, 10 mA

Answer: C

Watch Video Solution

14. A transistor connected in common emitter mode, the voltage drop across the collector is 2 V and β is 50, the base current if R_C is $2k\Omega$ is

A. $40\mu A$

B. $20\mu A$

C. $30\mu A$

D. $15\mu A$

Answer: B

Watch Video Solution

15. The power gain for common base amplifier is 800 and the voltage amplification factor is 840. The collector current when base current is 1.2 mA is

A. 24 mA

B. 12 mA

C. 6 mA

D. 3 mA

Answer: A

Watch Video Solution

16. The current gain for a common emitter amplifier is 69. If the emitter current is 7 mA, the base current is

A. 0.1 mA

B. 1 mA

C. 0.2 mA

D. 2 mA

Answer: A

Watch Video Solution

17. The potential difference across the collector of a transistor, used in common emitter mode is 1.5 V, with the collector resistance of $3k\Omega$, the emitter current is [$\beta = 50$]

A. 0.70mA

B. 0.51 mA

C. 1.1 mA

D. 1.9 mA

Answer: B

Watch Video Solution

18. In a common -emitter transistor amplifier, an increase of $50\mu A$ in the base current causes an increase of $1.0 mA$ in the collector current . Calculat gain β. What will be the change in emitter current? Also calculate current gain α

A. 1050 mA

B. 1050 μA

C. 5025 mA

D. 5025 μA

Answer: B

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19. For a common emitter transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 2 V. Suppose the current amplification factor of the transistor is 100, the base current if base resistance is $1k\Omega$ is

A. $10\mu A$

B. $20\mu A$

C. $5\mu A$

D. $2\mu A$

Answer: A

Watch Video Solution

20. The ac current gain of a transistor is 120. What is the change in the collector current in the transistor whose base current changes by $100\mu A$?

A. 6 mA

B. 12 mA

C. 3 mA

D. 24 mA

Answer: B

Watch Video Solution

21. In an n-p-n circuit transistor, the collector current is 10 mA. If 80% electrons emitted reach the collector, then

A. the emitter current will be 7.5 mA

B. the emitter current will be 12.5 mA

C. the base current will be 3.5 mA

D. the base current will be 1.5 mA

Answer: B

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

A. $3k\Omega$

B. $30k\Omega$

C. $1k\Omega$

D. $5k\Omega$

Answer: A

Watch Video Solution

23. The input resistance of a common emitter transistor amplifier, if the output resistance is $500k\Omega$, the current gain $\alpha = 0.98$ and the power gain is 6.0625×10^6 is

A. 198Ω

B. 300Ω

C. 100Ω

D. 400Ω

Answer: A

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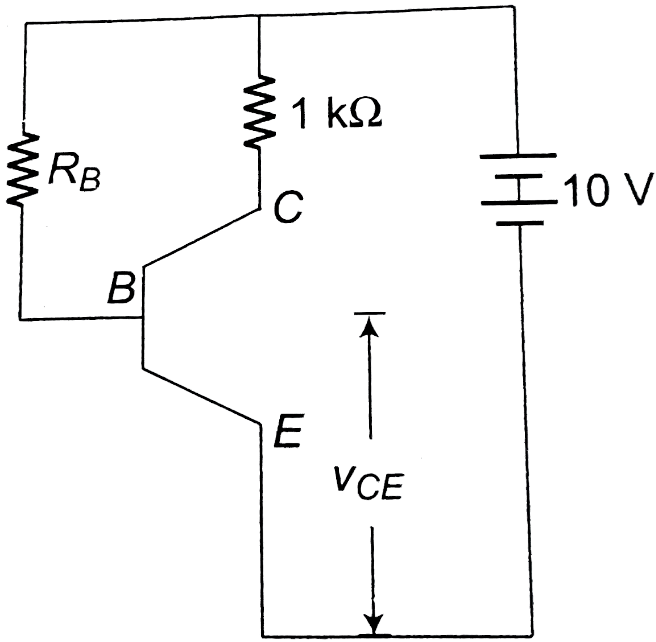
24. In the cuircuit shown here the transistor used has a current gain $\beta = 100$. What should be the bias resistor R_{BE} so that

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



A. $200 \times 10^3 \Omega$

B. $1 \times 10^6 \Omega$

C. 500Ω

D. $2 \times 10^3 \Omega$

Answer: A

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25. The input resistance of a transistor is 1000Ω on charging its base current by $10\mu A$, the collector current increases by 2 mA. If a load resistance of $5k\Omega$ is used in the circuit, the voltage gain of the amplifier is

A. 100

B. 500

C. 1000

D. 1500

Answer: C

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

A. 90

B. 180

C. 45

D. 360

Answer: B

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27. In a transistor connected in a common emitter mode $R_C = 4k\Omega, R_1 = 1k\Omega, I_C = 1mA$ and $I_B = 20\mu A$. Find the voltage gain.

A. 100

B. 200

C. 300

D. 400

Answer: B

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28. 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. 0.02

B. 7

C. 33

D. 49

Answer: A

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29. 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. 50

B. 100

C. 200

D. 150

Answer: B

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30. What is the voltage gain in a common emitter amplifier, where input resistance is 3Ω and load resistance 24Ω and $\beta = 61$?

A. 8.4

B. 488

C. 240

D. 0

Answer: B

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31. An amplifier has a voltage gain of 100. The voltage gain in dB is

A. 20 dB

B. 40 dB

C. 30 dB

D. 50 dB

Answer: B

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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 of 5mA to 10 mA. The current gain is

A. 100

B. 150

C. 75

D. 50

Answer: D

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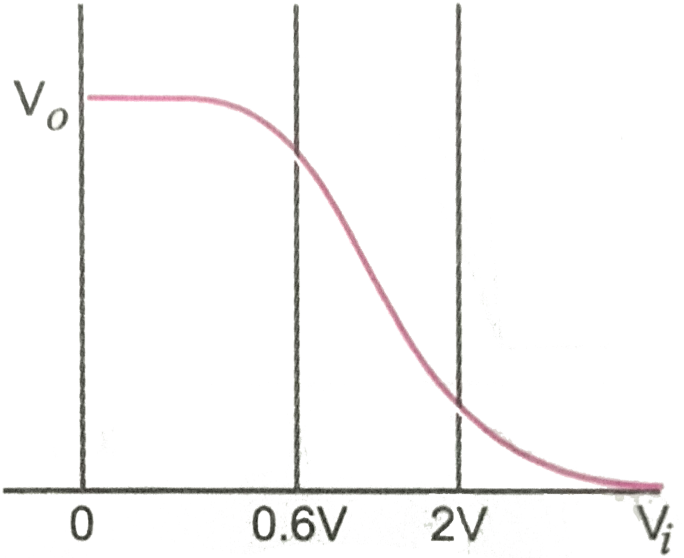
33. Fig.shows that transfer characteristics of a base biased CE transistor. Which of the following statements are true?



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

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

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

D. All of these

Answer: D

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Digital Electronics And Logic Gates

1. Boolean algebra is essentially based on

A. number

B. truth

C. logic

D. symbol

Answer: C

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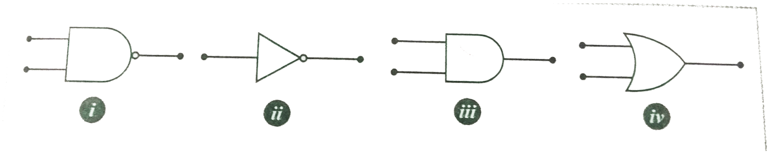
2. The symbolic representation of four logic gates are given in Fig.The logic symbol for OR, NOT and NAND gates are respectively



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

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

C. (i), (ii), (iv)

D. (ii), (iv), (i)

Answer: B

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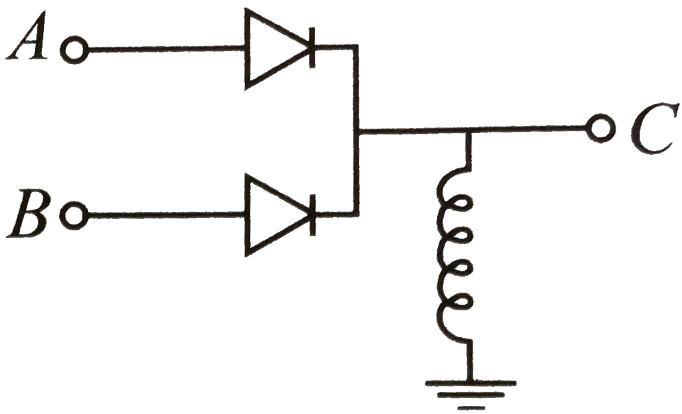
3. In the circuit below, A and B represents two inputs and C represents the output . The circuit represents



A. AND gate

B. NOR gate

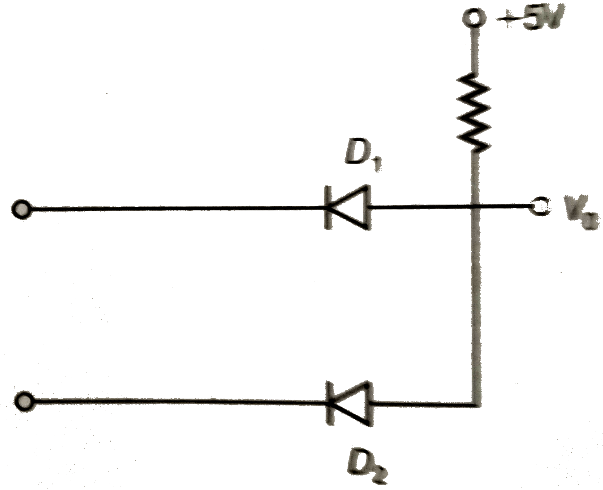
C. OR gate

D. NAND gate

Answer: C

Watch Video Solution

4. Write the truth table for the circuit shown in figure given below. Name the gate that the circuit resembles.



A. NAND

B. AND

C. OR

D. NOR

Answer: B

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5. In boolean algebra, if $A = 1$ and $B = 0$ then the value of $A + \overline{B}$ is

A. A

B. A.B

C. A+B

D. Both (a) and (c)

Answer: D

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6. 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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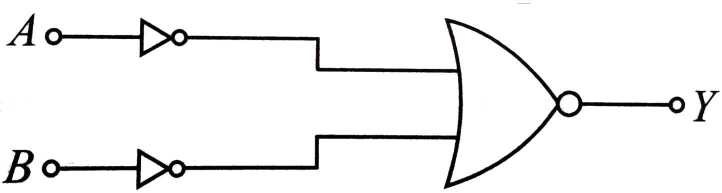
7. The circuit given in figure, is equivalent to



A. AND gate

B. OR gate

C. NOT gate

D. NAND gate

Answer: A

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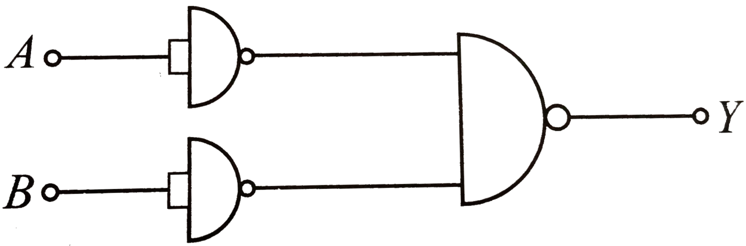
8. The combination of NAND gates is shown in figure.The equivalent circuit is



A. AND gate

B. NOR gate

C. OR gate

D. NOT gate

Answer: C

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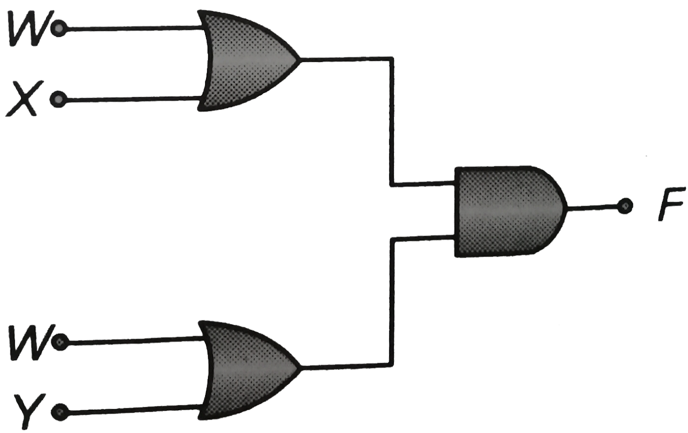
9. The diagram of a logic circuit is given below.

The output F of the circuit is represented by



A. W.(X+Y)

B. W.(X.Y)

C. W+(X.Y)

D. W+(X+Y)

Answer: C

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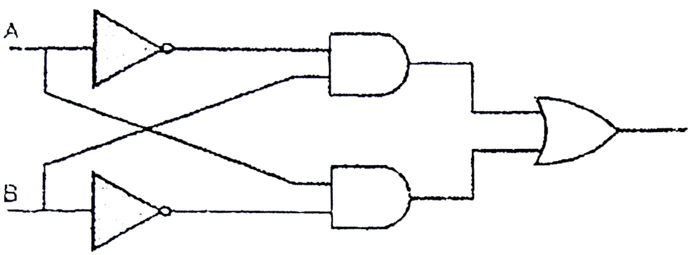
10. 

The truth table of the logic circuit shown-

A. (a)

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

B. (b)

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

C. (c)

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

D. (d)

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

Answer: A

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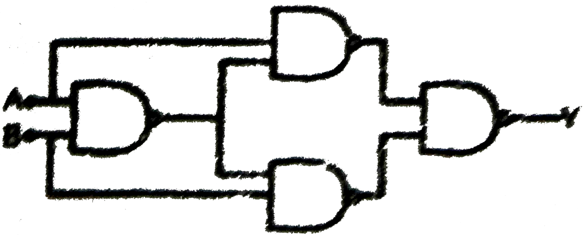
11. Select the outputs Y of the combination of gates shown below for inputs $A = 1, B = 0, A = 1, B = 1$ and $A = 0, B = 0$ respectively :-



A. (0,1,1)

B. (1,0,1)

C. (1,1,1)

D. (1,0,0)

Answer: D

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12. The given truth table is for which

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

A. NAND

B. XOR

C. NOR

D. OR

Answer: A

Watch Video Solution

13. Which of the following truth tables corresponds to NAND gate ?

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

(i)

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

(ii)

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

(iii)

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

(iv)

(a) (iv) (b) (iii) (c) (ii) (d) (i)

A. (iv)

B. (iii)

C. (ii)

D. (i)

Answer: D

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14. The decimal equivalent of the binary number $(11010.101)_2$ is

A. 9.625

B. 25.265

C. 26.625

D. 26.265

Answer: D

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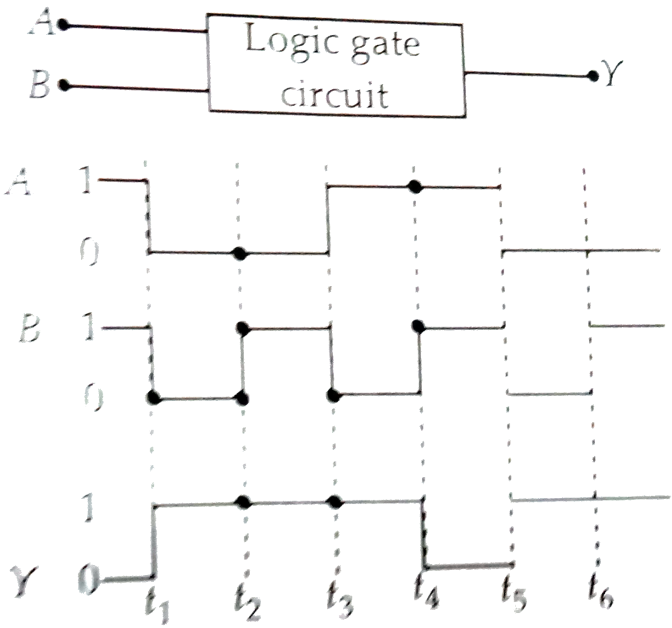
15. The following figure shows a logic gate circuit with two inputs A and B and the output Y. The voltage waveforms of A,B and Y are as given :



The logic gate is

A. NOR gate

B. OR gate

C. AND gate

D. NAND gate

Answer: D

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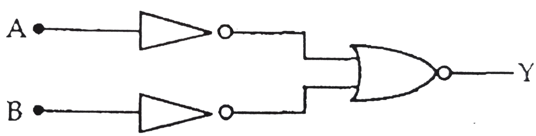
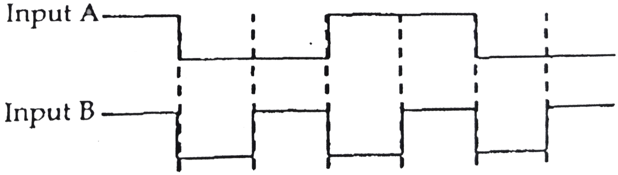
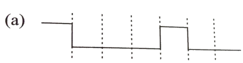
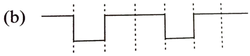
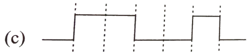
16. The logic circuit shown below has the input waveforems 'A' and 'B' as shown. Pick out the correct output waveform

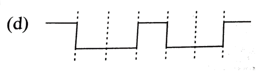




A. 

B. 

C. 

D. 

Answer: A

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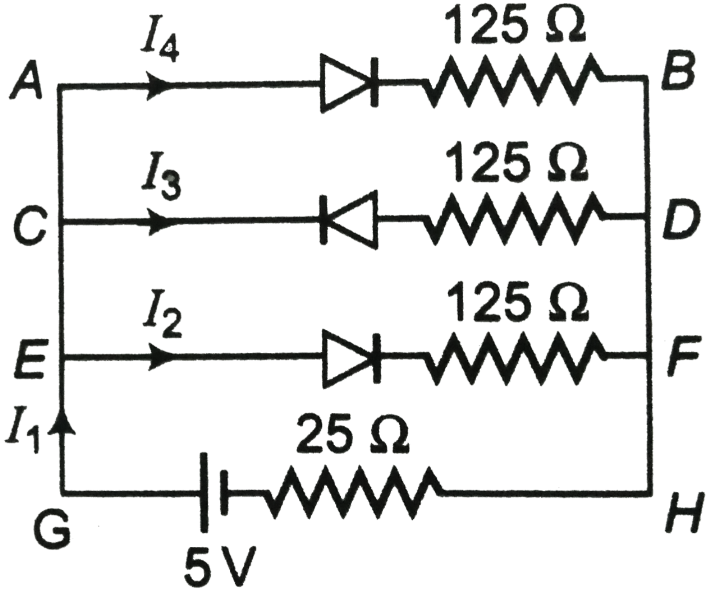
Higher Order Thinking Skills

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



A. $I_2 = 0.40A, I_4 = 0.025A$

B. $I_2 = 0.25A, I_4 = 0.20A$

C. $I_1 = 0.05A, I_3 = 0.02A$

D. $I_2 = I_4 = 0.025A$

Answer: D

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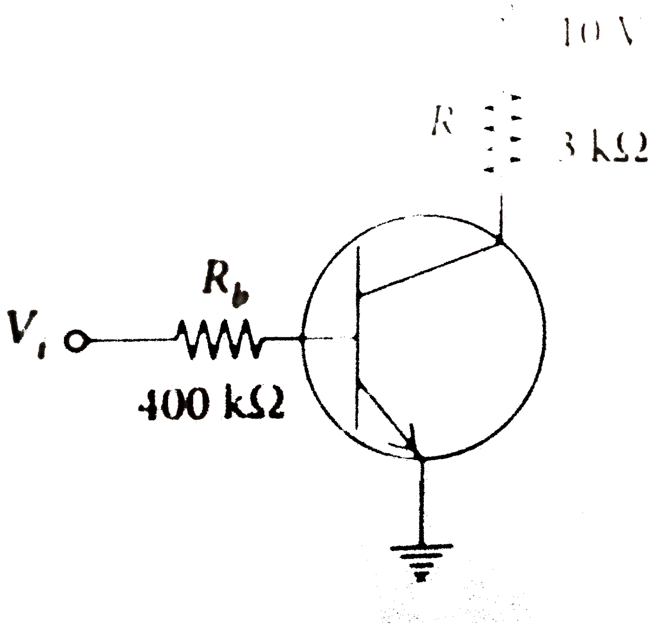
2. In the circuit shown in figure, when the input voltage of the base resistance is 10 V, V_{be}

is zero and V_{ce} is also zero. Then



A. $\beta = 110$

B. $I_b = 25\mu A$

C. $I_c = 3.33mA$

D. both (A) and (C)

Answer: D

Watch Video Solution

3. 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. 10^6 V/m

B. 10^7 V/m

C. 10^5 V/m

D. 10^4 V/m

Answer: A

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4. If an electron approaches the p-n junction from the n-side with a speed of $5 \times 10^5 ms^{-1}$,with what speed will it enter the p-side?

A. 5×10^5 m/s

B. 2.5×10^6 m/s

C. 2.7×10^5 m/s

D. 1×10^5 m/s

Answer: C

Watch Video Solution

5. An n-p-n transistor in a common-emitter mode is used as a simple voltage-amplifier with a collector current of 4 mA. The terminals of a 8 V battery is connected to the collector through a load-resistance R_L and to the base through a resistance R_B. The collector-emitter voltage $V_{CE} = 4V$, the base-emitter voltage $V_{BE} = 0.6V$ and the current amplification factor $\beta_{dc} = 100$. Then

A. $R_L = 1k\Omega, R_B = 185k\Omega$

B. $R_L = 2k\Omega = R_B$

C. $R_L = 2k\Omega, R_B = 15k\Omega$

D. $R_L = 185k\Omega, R_B = 1k\Omega$

Answer: A

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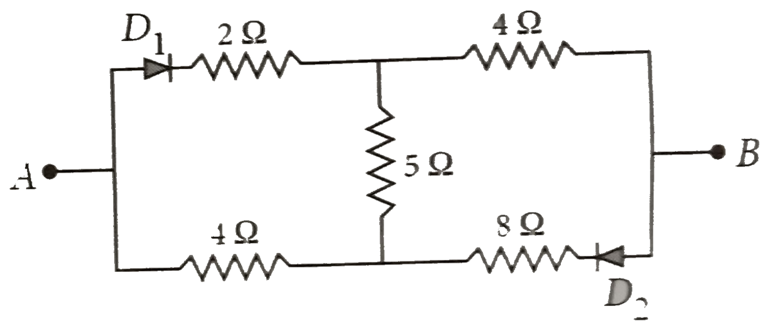
6. The equivalent resistance of the circuit, across AB is given by



A. 6.2Ω

B. 5.64Ω

C. 8.2Ω

D. 5.6Ω or 8.2Ω

Answer: D

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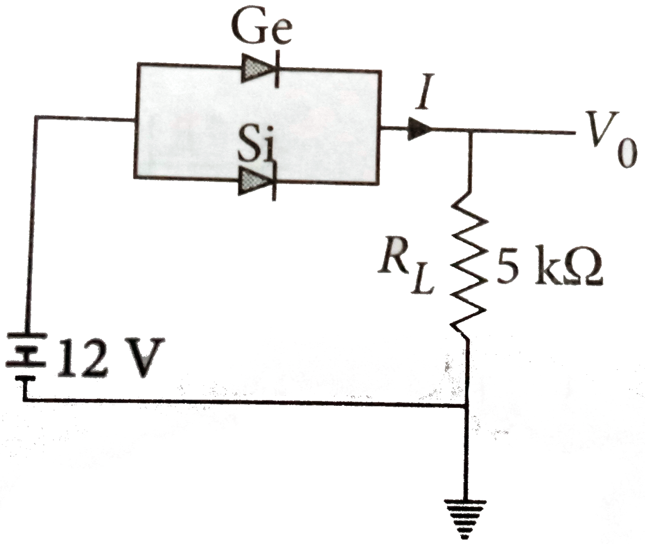
7. In the circuit shown in figure, the silicon and germanium diodes start conducting at 0.7 V and 0.3 V respectively. What are the values of

V_0 and I?



A. 12 V, 2.4 mA

B. 11.7 V, 2.34 mA

C. 11.3 V, 2.26 mA

D. 11 V, 2.2 mA

Answer: B

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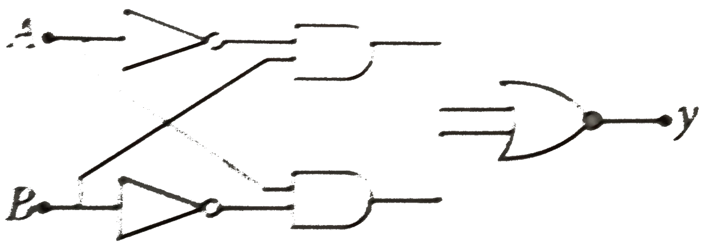
8. The Boolean expression of the output y in terms of the input A and B for the circuit shown in figure.



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

B. AB

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

D. $A\overline{B} + 1$

Answer: C

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Ncert Exemplar

1. The conductivity of a semiconductor increases with increase in temperature because

A. number density of free current carriers increases

B. relaxation time increases.

C. both number density of carriers and relaxation time increase

D. number density of current carriers increases, relaxation time decreases but effect of decrease in relaxation time is much less than increase in number density

Answer: D

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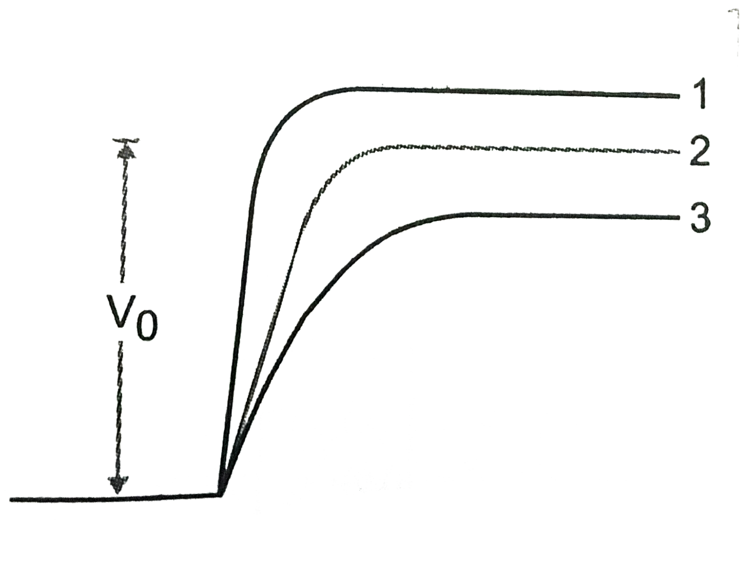
2. In Fig . V_0 is the potential barrier across a p-n junction, when no battery is connected across the junction



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

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

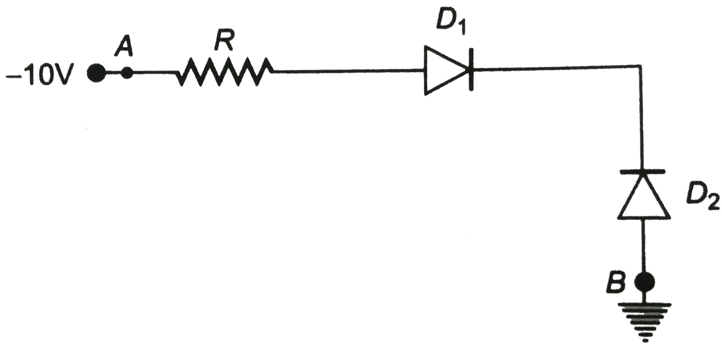
C. 1 corresponds to forward bias and 3 corresponds to reverse bias of junction.

D. 3 and 1 both correspond to reverse bias of junction.

Answer: B

Watch Video Solution

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



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

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

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

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

Answer: B

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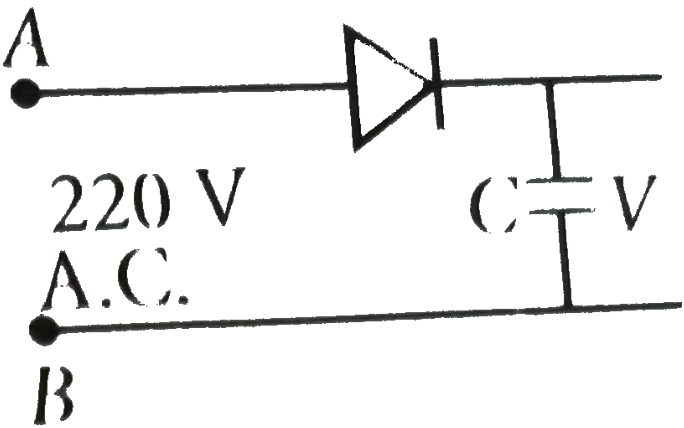
4. A 220 V ac supply is connected between points A and B as shown 220 V in figure. What will be the potential AC difference V across the capacitor?



A. 220 V

B. 110 V

C. 0 V

D. $200\sqrt{2}V$

Answer: D

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5. Hole is

A. an anti-particle of electron

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

C. absence of free electrons.

D. an artificially created particle.

Answer: B

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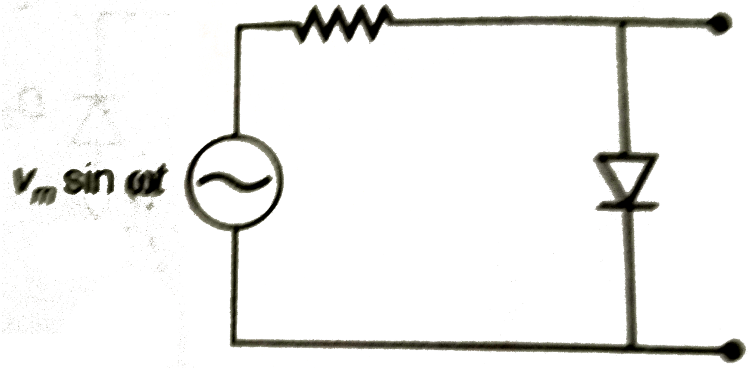
6. The output of the given circuit in figure given below,



A. would be zero at all times.

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

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

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

Answer: C

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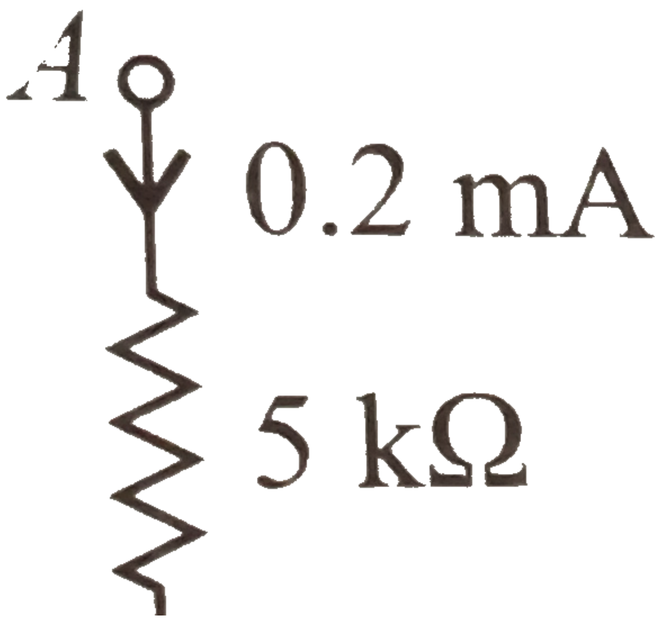
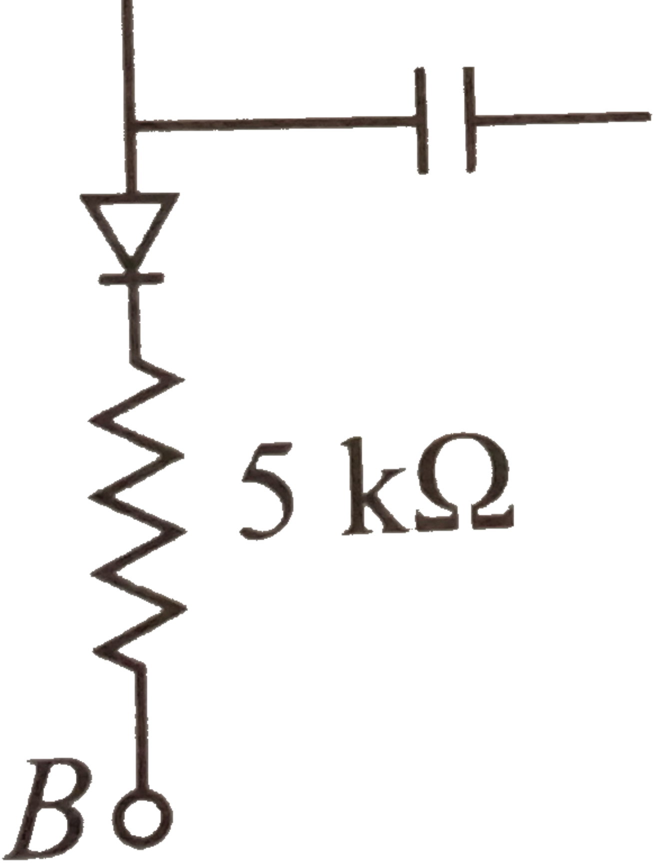
7. In the circuit shown in figure, if the A diode forward voltage drop is 0.3 V, the voltage difference between A and B is





A. 1.3 V

B. 2.3 V

C. 0

D. 0.5 V

Answer: B

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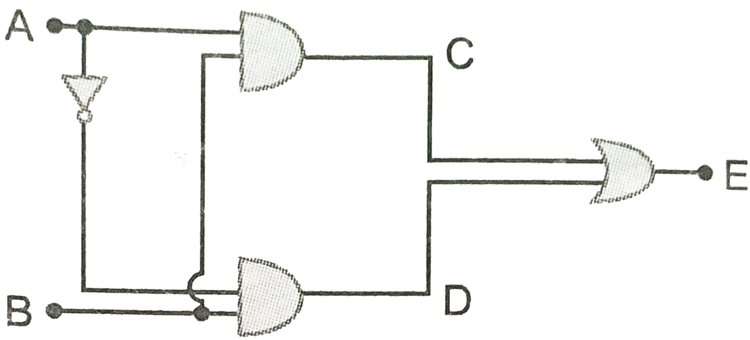
8. Truth table for the given circuit (Fig.)is



A. (a)

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

B. (b)

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

C. (c)

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

D. (d)

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

Answer: C

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Assertion And Reason

1. Assertion: If there is some gap between the conduction band and the valence band, electrons in the valence band all remain bound and no free electrons are available in the conduction band. Then the material is an insulator.

Reason: Resistance of insulators is very low

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

assertion.

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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2. Assertion : The electrons in the conduction band have higher energy than those in the valence band of a semiconductor

Reason : The conduction band lies above the energy gap and valence band lies below the energy gap.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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3. Assertion : In a semiconductor, the conduction electrons have a higher mobility than holes.

Reason: The electrons experience fewer collisions.

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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4. Assertion: The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature decrease exponentially with increasing band gap.

Reason: It will be more difficult for the electron to cross over the large band gap while going from valence band to conduction band.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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5. Assertion: The conductivity of an intrinsic semiconductor depends on its temperature.

Reason The conductivity of an intrinsic semiconductor is slightly higher than that of a lightly doped p-type semiconductor.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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6. Assertion: The conductivity of an intrinsic semiconductor depends on its temperature

Reason: No important electronic devices can be developed using intrinsic semiconductors.

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

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7. Assertion: Thickness of depletion layer is fixed in all semiconductor devices.

Reason: No free charge carriers are available in deplection layer.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: D

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8. Assertion: Zener diode works on aa principle of of breakdown voltage.

Reason: Current increases suddenly after breakdown voltage.

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

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9. Assertion : Zener diode is used to obtain voltage regulation

Reason : When Zener diode is operated in reverse bias, after a certain voltage (breakdown voltage) the current suddenly increases.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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10. Assertion: The semiconductor used for fabrication of visible LEDs must at least have a band gap of 1.8 eV.

Reason: The spectral range of visible light is 0.4 eV to 1.8 eV

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

assertion.

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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11. Assertion : In a transistor the base is made thin.

Reason: A thin base makes the transistor stable.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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12. Assertion : Two p-n junction diodes placed back to back, will work as a n-p-n transistor.

Reason: The p-region of two p-n junction diodes back to back will form the base of n-p-n transistor.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: D

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13. Assertion : In an oscillator, the feedback is in the same phase which is called as positive feedback.

Reason: If the feedback voltage is in opposite phase, the gain is greater than one.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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14. Assertion : In an OR gate if any of the input is high, the output is high.

Reason: OR gate is the most basic gate, with one input and one output

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

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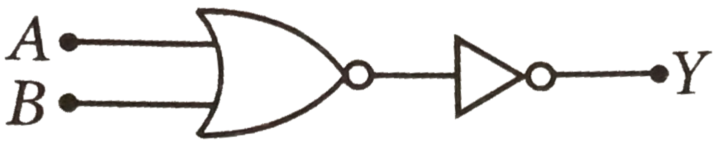
15. Assertion:



This circuit acts as OR Gate.

Reason: Truth table for two input OR Gate is

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

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

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

explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

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