PHYSICS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR PHYSICS

SEMICONDUCTORS

Exercise-1

1. The mobility of electrons when compared tot hat of holes is

A. greater

B. smaller

C. same

D. all the above are possible.

Answer: A

Watch Video Solution

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

A. $\mu_e > \mu_h$

B. $\mu_e < \mu_h$

C. $\mu_e = \mu_h$

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

Answer: A

Watch Video Solution

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

A. greater than 0.55 eV

B. equal to 0.55 eV

C. less than 0.55 eV

D. equal to 1.1 eV

Answer: A

Watch Video Solution

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

A. in the middle of forbidden gap

B. Below the middle of forbidden gap

C. Above the middle of forbidden gap

D. outside the forbidden gap

Answer: A

Watch Video Solution

5. The energy of a photon of sodium light wavelength 5890Å equals the energy gap of a semiconducting material. Find the minimum energy E required to create a hole-electron combination. the value of E/kT at a temperature of $27^\circ C$, where $k = 8.62 \times 10^{-5} eV/K, h = 6.63 \times 10^{-34} Js.$

A. 0.026 eV

B. 0.31 eV

C. 2.1 eV

D. 6.4 eV

Answer: C

Watch Video Solution

6. When impurity atoms like trivalent or pentavalent are added insuitable amounts, to a semiconductor then

A. its resistance increases

B. its conductivity decreases

C. resistances has no effect

D. conductivity increase.

Answer: D

Watch Video Solution

7. If n-type semiconductor is heated then

A. the number of electrons increases and the number of holes decreases

B. the number of holes increases and the number of electrons decreases

C. at the number of electrons and holes both remains equal

D. the number of both electrons and holes increases.

Answer: D

Watch Video Solution

8. P-type semiconductor is formed when

(A). As impurity is mxied in Si

(B). Al impurity is mixed in Si

(C). B impurity is mixed in Ge

(D). P impurity is mixed in Ge.

A. A and C

B. A and D

C. B and C

D. B and D

Answer: C

Watch Video Solution

9. In extrinsic semiconductors-

A. The conduction band and valence band overlap

B. The gap between conduction band and valence band is more than 16 eV

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

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

Answer: C

Watch Video Solution

10. if n_e and v_d be the number of electrons and drift velocity in a semiconductor. When the temperature is increased.

A. n_e increases and v_d. Decreases

B. n_e decreases and v_d increases

C. Both n_e and v_d increases

D. Both n_e and v_d decreases.

Answer: A

Watch Video Solution

11. In a semiconductor the concentrations of electrons and holes are $8 \times 10^{18}/m^3$ and $5 \times 10^{18}/m^3$ respectively. If the mobilities of electrons and hole are $2.3 \frac{m^2}{\text{volt-sec}}$ and $0.01 m^2/\text{volt-sec}$ respectively, then semiconductor is-

A. Ntype and its resistivity is 0.34 ohm-metre

B. P-type and its resistivity is 0.034 ohm-metre

C. N-type and its resistivity is 0.034 ohm-metre

D. P-type and its resistivity is 3.40 ohm-meter.

Answer: A

Watch Video Solution

12. A potential difference of 2V is applied between the opposite faces of a Ge crystal plate of area $1cm^2$ and thickness 0.5 mm. if the concentration of electrons in Ge is $2 \times 10^{19}/m^3$ and mobilities of electrons and holes are 0.36 $\frac{m^2}{\text{volt-sec}}$ and $0.14\frac{m^2}{\text{volt-sec}}$ respectivity, then the current flowing through the plate will be-

A. 0.25 A

B. 0.45 A

C. 0.56 A

D. 0.64 A

Answer: D

Watch Video Solution

13. A potential barrier of 0.50 V exists across a P-N juntion. If the depletion region is $5.10 \times 10^{-7} m$ wide, the intensity of the electric field in this region is

A. $1.0 \times 10^{6} V/m$

B. $1.0 \times 10^{5} V/m$

C. $2.0 \times 10^{5} V/m$

D. $2.0 \times 10^{6} V/m$

Answer: A

Watch Video Solution

14. No bias is applied to a P-N junction, then the current-

A. Is zero because the number of charge carriers flowing on both sides is same

B. is zero because the charge carriers do not move

C. Is non-zero

D. None of these

Answer: A

Watch Video Solution

15. If the two ends of a p-n junction are joined by a conducting wire, then

A. there will be no current in the circuit

B. there will be steady current from n-side to n-side

C. there will be steady current from p-side to n-side

D. There will be a steady current in the circuit.

Answer: A

Watch Video Solution

16. you have three identical pn junction, junction 1 is unbiased, junction 2 is reverse biased and junction 3 is forward biased. From largest to smallest, rank the three junction according to the magnitude of their diffusion currents.

A. 1,2,3

B. 3,1,2

C. 3,2,1

D. 2,3,1

Answer: B

Watch Video Solution

17. The main cause of avalance breakdown is

A. collision ionisation

B. high doping

C. recombination of electrons and holes

D. None of these

Answer: A

Watch Video Solution

18. What is zener breakdown?

A. The base semiconductor being germanium

B. production of electron-hole pairs due to electric field

C. low doping

D. high doping

Answer: B

Watch Video Solution

19. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon P-N juntions are-

A. Drift in forward bias, diffusion in reversebias

B. Diffusion in forward bias, drift in reverse bias

C. Diffusion in both forward and reverse bias

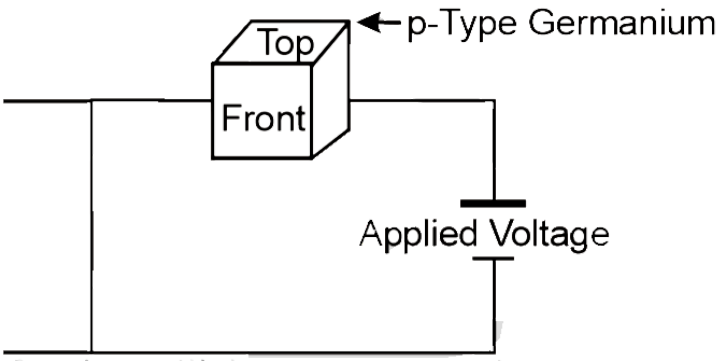
D. Drift in both forward and reverse bias

Answer: B

Watch Video Solution

20. A cube of germanium is placed between the poles of a magnet and a voltage is applied across opposite faces of the cube as shown in Figure. Magnetic field is directed vertical downward in the plane of the paper :

What effect will occur at the surface of the cube ?



A. The top surface of cube will become negatively charged.

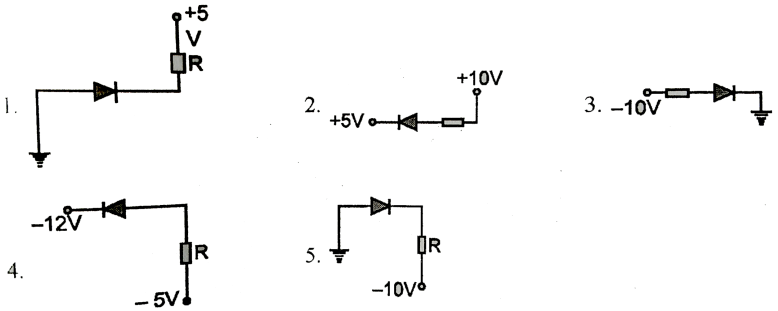
B. The front surface of the cube will become positively charge

C. The front surface of the cube will become negatively charged.

D. Both top and front surface of cube will become positively charged.

Answer: B

Watch Video Solution



21.

In the given figure, which of the diodes are forward biased?

A. 1,2,3

B. 2,4,5

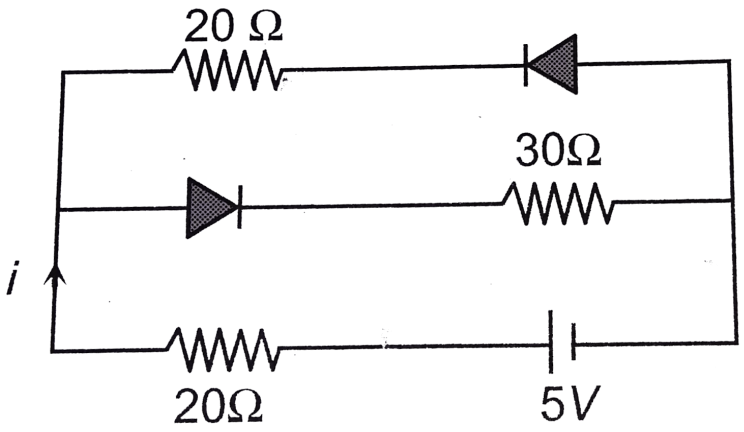
C. 1,3,4

D. 2,3,4

Answer: B

Watch Video Solution

22. Current in the circuit will be



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

B. $\frac{1}{10}A$

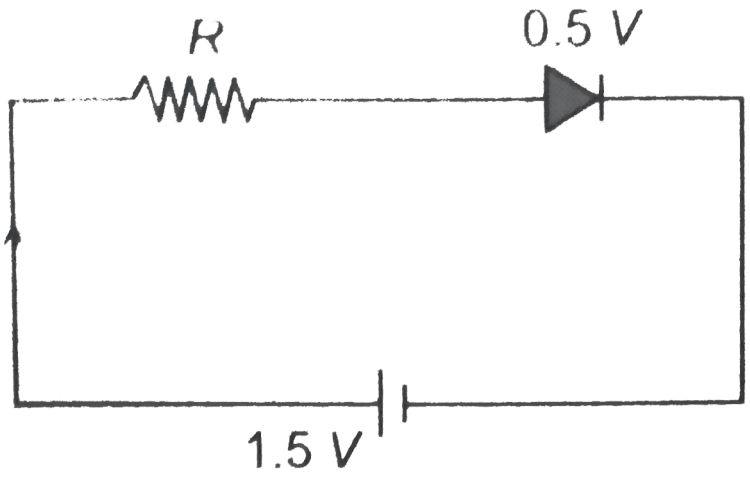
C. $\frac{5}{10}A$

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

Answer: B

Watch Video Solution

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



A. 1.5Ω

B. 5Ω

C. 6.67Ω

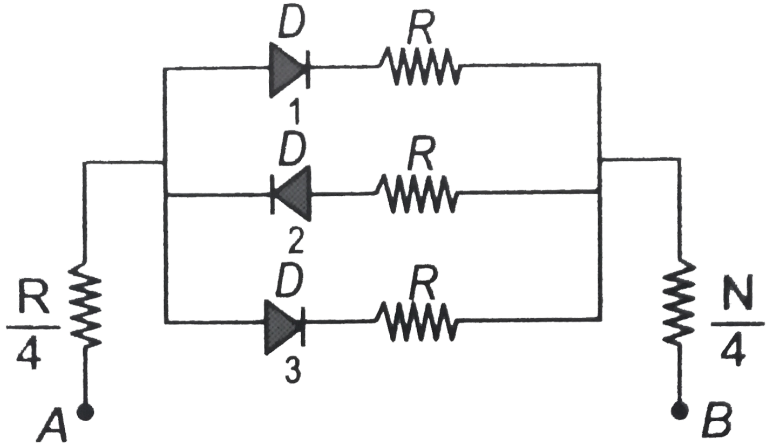
D. 200Ω

Answer: B

Watch Video Solution

Watch Video Solution

24. In the following circuits PN-junction diodes D_1, D_2 and D_3 are ideal for the following potential of A and B, the correct increasing order to resistance between A and B will be



$(i) -10V, -5V (ii) -5V, -10V$

$(iii) -4V, -12V$

A. (i)lt(ii)lt(iii)

B. (iii)lt(ii)lt(i)

C. (ii)=(iii)lt(i)

D. (i)=(iii)lt(ii)

Answer: C

Watch Video Solution

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

A. 50 Hz

B. 70.7 Hz

C. 100 Hz

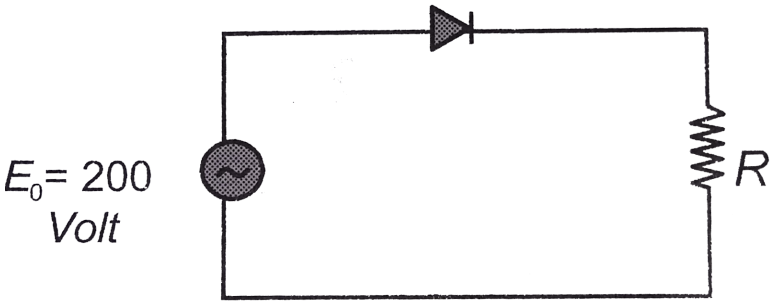
D. 25 Hz

Answer: C

Watch Video Solution

26. A sinusoidal voltage of peak value 200 volts is connected to a diode and resistor R in the circuit shown so that half wave rectification occurs.

If the forward resistance of the diode is negligible compared to R the rms voltage (in volt) across R is approximately



(b) 100

A. 200

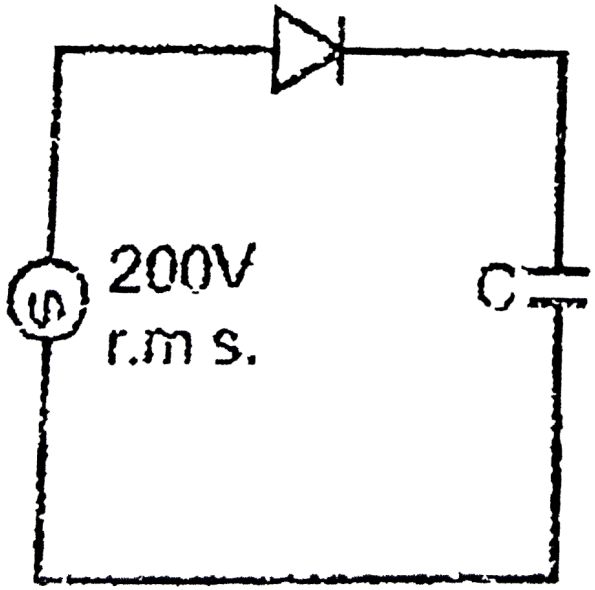
B. 100

C. $\frac{200}{\sqrt{2}}$

D. 280

Answer: B

Watch Video Solution



27.

In the figure an A.C of rms voltage 200 volt is appled to the circuit containing diode and the capacitor and it is being rectified. The maximum potential across the capacitor C in volt will be

A. 500 V

B. 200 V

C. 283 V

D. 141 V

Answer: C

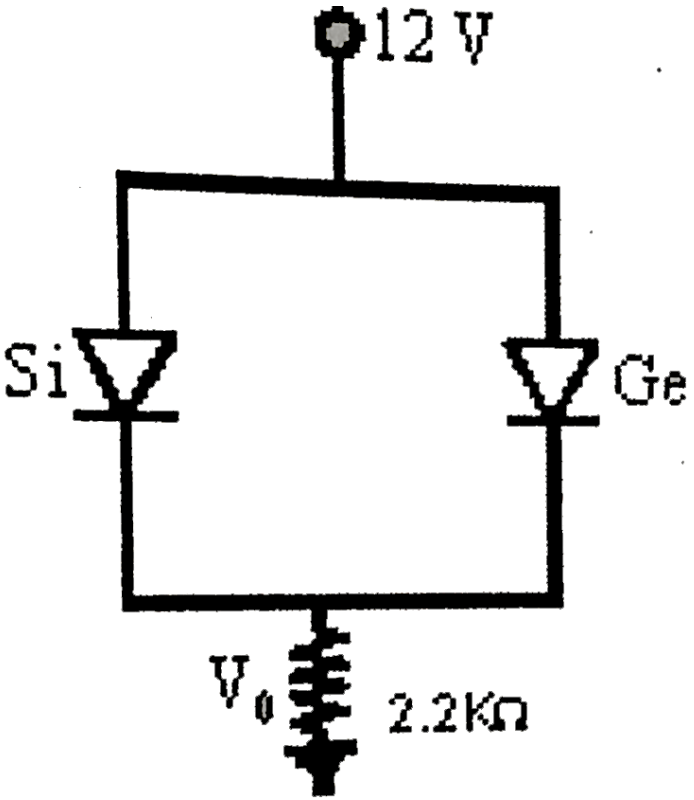
Watch Video Solution

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

- VC,VC
- VC/e,VC
- VC,VC/e
- VC/e,VC/e

Answer: B

Watch Video Solution



29.

In the circuit shown infigure, voltage V_0 is,

A. 11.7 volt

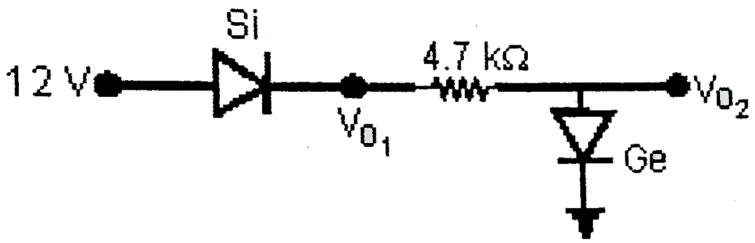
B. 11.3 volt

C. 0

D. None of these

Answer: A

Watch Video Solution



30.

In the given circuit $V_{O_1} \& V_{O_2}$ are

A. 11.3 V 0.3 V

B. 0.3 V & 11.3 V

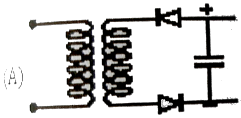
C. 11.3 V & 11.3 V

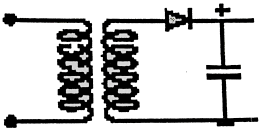
D. 0.3 V & 0.3 V

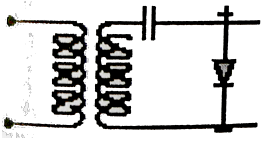
Answer: A

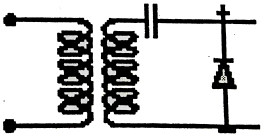
Watch Video Solution

31. Which is the correct diagram of a half- wave reactifier?

A. 

B. 

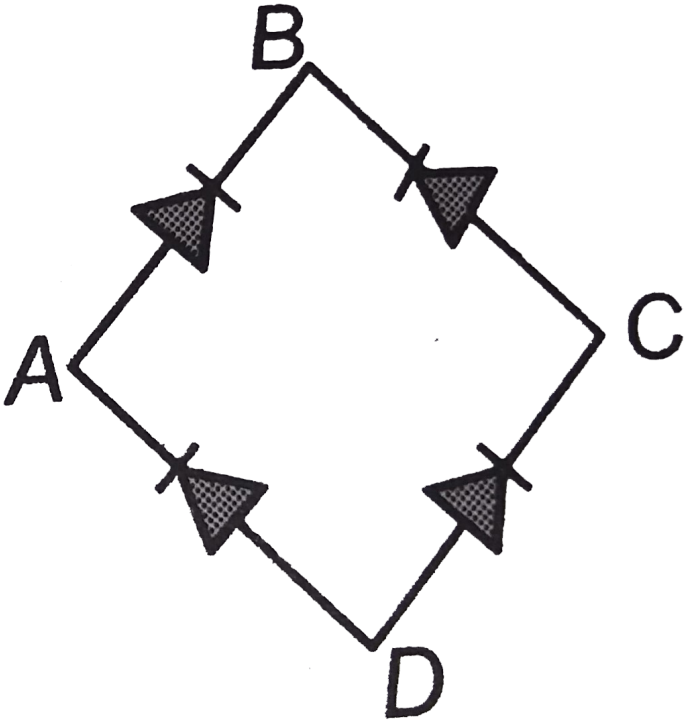
C. 

D. 

Answer: B

Watch Video Solution

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



A. Zero

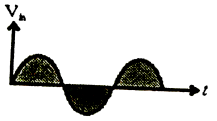
B. same as input

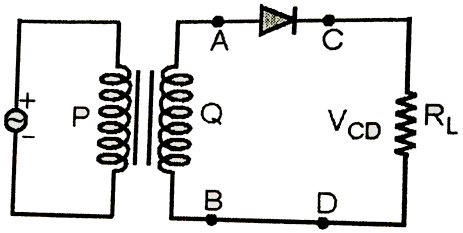
C. full wave rectifier

D. half wave rectifier

Answer: C

Watch Video Solution

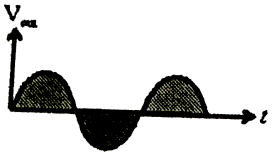




33.

In the half-wave rectifier circuit shown. Which one of the following wave forms in true for V_{CD}, if the input is as shown?

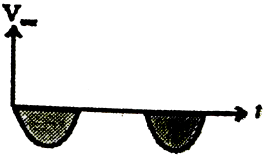
A.



B.

C.

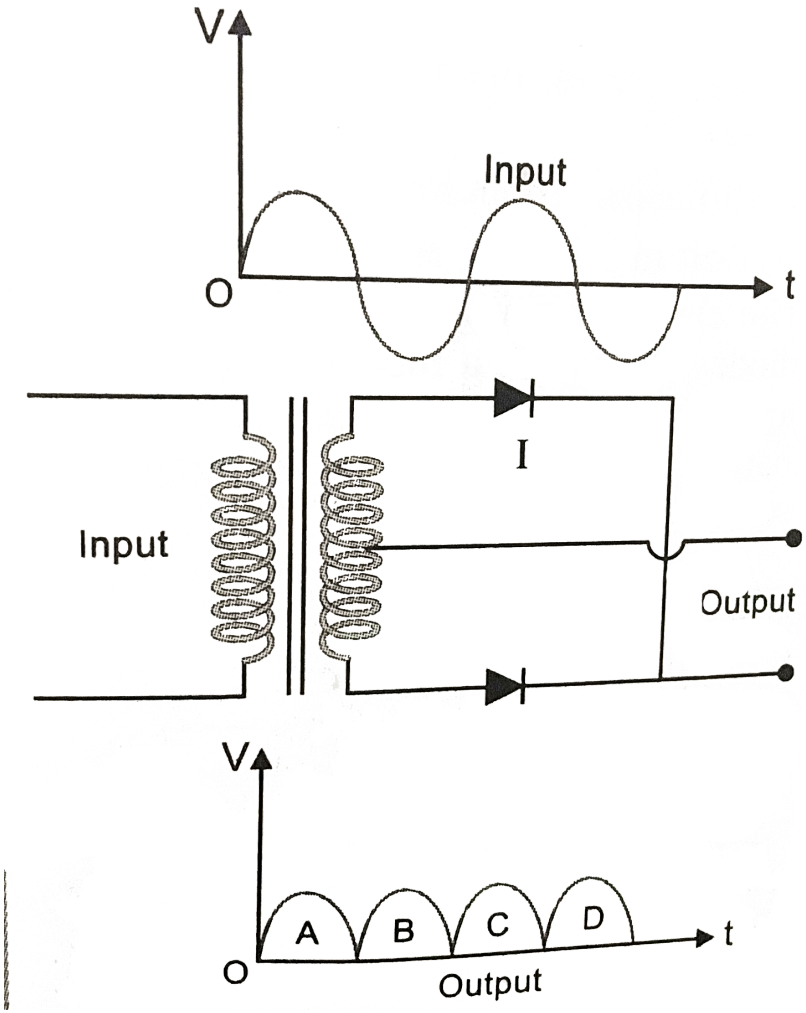
D.



Answer: B

Watch Video Solution

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



A. A, C

B. B, D

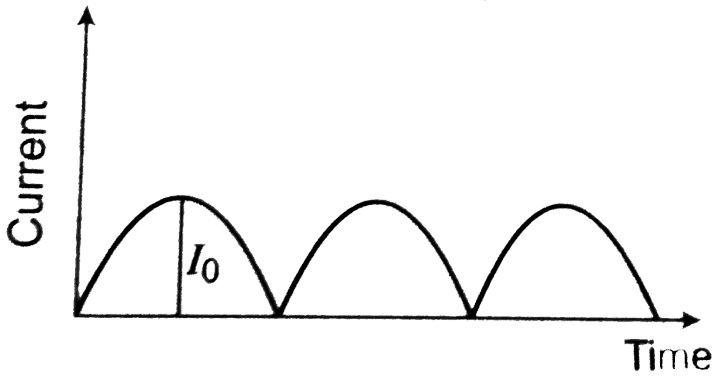
C. B, D

D. A, D

Answer: B

Watch Video Solution

35. The output current versus time curve of a rectifire is shown in the figure. The voltage value of output current in this case is



A. 0

B. i_0 / π

C. $2i_0 / \pi$

D. i_0

Answer: C

Watch Video Solution

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

A. they have low cost

B. they have low dissipation energy

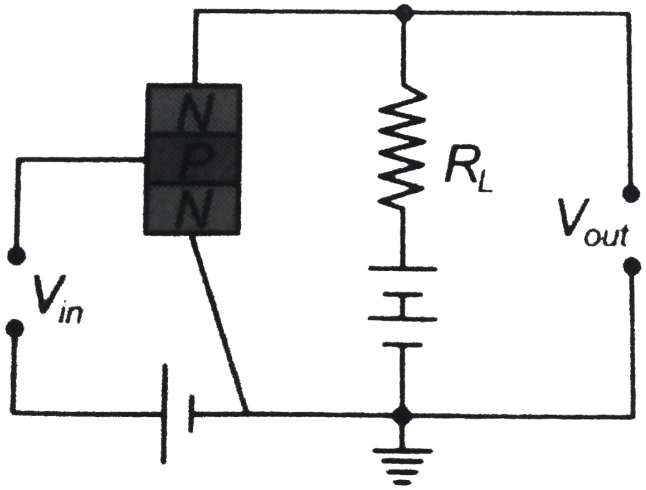
C. they are capable of handling large power

D. electrons have high mobility thn holes.

Answer: D

Watch Video Solution

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



A. a common-base amplifier circuit

B. a common-emitter amplifier circuit

C. a common-collector amplifier circuit

D. none of the above.

Answer: B

Watch Video Solution

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

A. 6 mA

B. 4.8 mA

C. 24 mA

D. 8 mA

Answer: C

Watch Video Solution

39. What is the voltage gain in a common emitter amplifier where input resistance is 3Ω and load resistance is 24Ω :- $(\beta = 6)$?

A. 8.4

B. 4.8

C. 2.4

D. 12

Answer: D

Watch Video Solution

40. A transistor, connected in common emitter configuration, has input resistance $R_i = 2k\Omega$ and load resistance $6k\Omega$. If $\beta = 60$ and an input signal $10mV$ is applied, calculate the (i) resistance gain, (ii) voltage gain (iii) the power gain

A. 9000

B. 4000

C. 6000

D. 8000

Answer: A

Watch Video Solution

41. Given below are four logic gates symbol (figure). Those for OR, NOR and NAND are respectively

A. 1,4,3

B. 4,1,2

C. 1,3,4

D. 4,2,1

Answer: C

Watch Video Solution

42. The following truth table corresponds to the logic gate

$$\begin{vmatrix} A & 0 & 0 & 1 & 1 \\ B & 0 & 1 & 0 & 1 \\ X & 0 & 1 & 1 & 1 \end{vmatrix}$$

A. NAND

B. OR

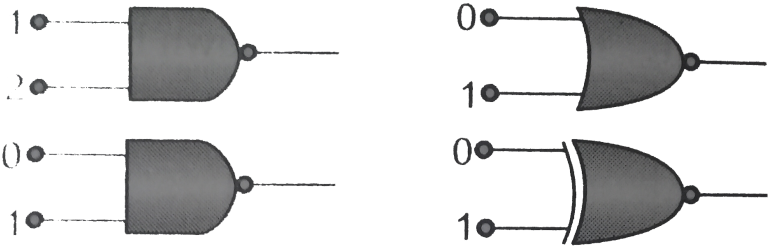
C. AND

D. XOR

Answer: B

Watch Video Solution

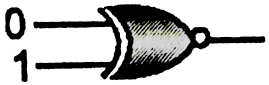
43. Which of the following gates will have an output of 1?



A. 

B. 

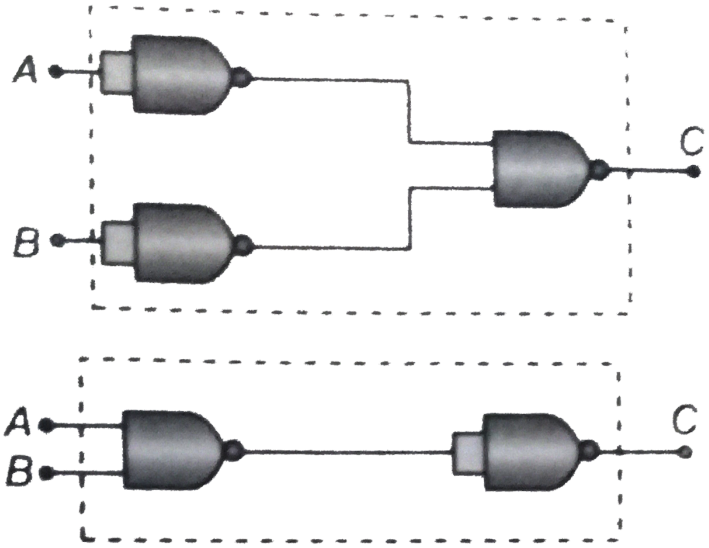
C. 

D. 

Answer: C

Watch Video Solution

44. The combination of $'NAND'$ gates shown here under (figure) are equivalent to



A. An OR gate and an AND gate respectively

B. An AND gate and a NOT gate respectively

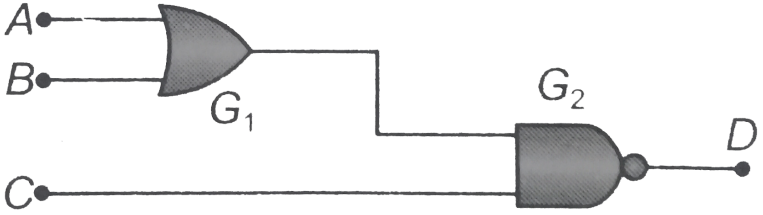
C. An AND gate and an OR gate respectively

D. An OR gate and NOT gate respectively.

Answer: A

Watch Video Solution

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



A. 0,0

B. 0,1

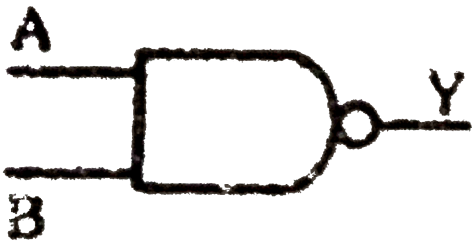
C. 1,0

D. 1,1

Answer: D

Watch Video Solution

46. The symbol represents :-



A. NOT gate

B. OR gate

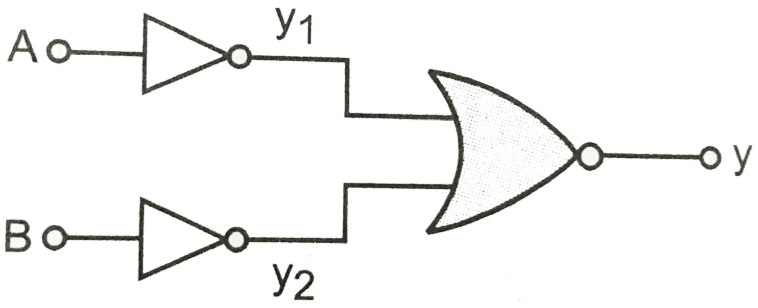
C. AND gate

D. NOR gate

Answer: A

Watch Video Solution

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



A. OR

B. NAND

C. AND

D. NOR

Answer: C

Watch Video Solution

48. If a carrier wave of 1000 kHz is used to carry the signal, the length of transmitting antenna will be equal to -

A. 3 m

B. 30 m

C. 300 m

D. 3000 m

Answer: C

Watch Video Solution

49. The velocity of electromagnetic waves in a dielectric medium $(\in_r = 4)$ is

A. $3 \times 10^8 m/s$

B. $1.5 \times 10^8 m/s$

C. $6 \times 10^8 m/s$

D. $7.5 \times 10^7 m/s$

Answer: B

Watch Video Solution

50. Through which mode of propagation, the radio waves can be sent from one place to another

A. Ground wave propagation

B. Sky wave propagation

C. Space wave propagation

D. all of them

Answer: D

Watch Video Solution

51. The frequencies of electromagnetic waves employed in space communication lie in the range of -

A. $10^4 Hz$ to $10^7 Hz$

B. $10^4 Hz$ to $10^{11} Hz$

C. 1 Hz to $10^4 Hz$

D. 1 Hz to $10^{11} Hz$

Answer: B

Watch Video Solution

52. The ratio waves of frequency $300 MHz$ to $3000 MHz$ belong to

A. High frequency band

B. Very High frequency band

C. Ultra high frequency band

D. super high frequency band

Answer: C

Watch Video Solution

53. The maximum range of ground or surface wave propagation depends on-

A. the frequency of the radiowaves only

B. power of the transmitter only

C. both of them

D. none of them

Answer: C

Watch Video Solution

54. For television broadcasting, the frequency employed is normally

A. 30-300 M Hz

B. 30-300 G Hz

C. 30-300 K Hz

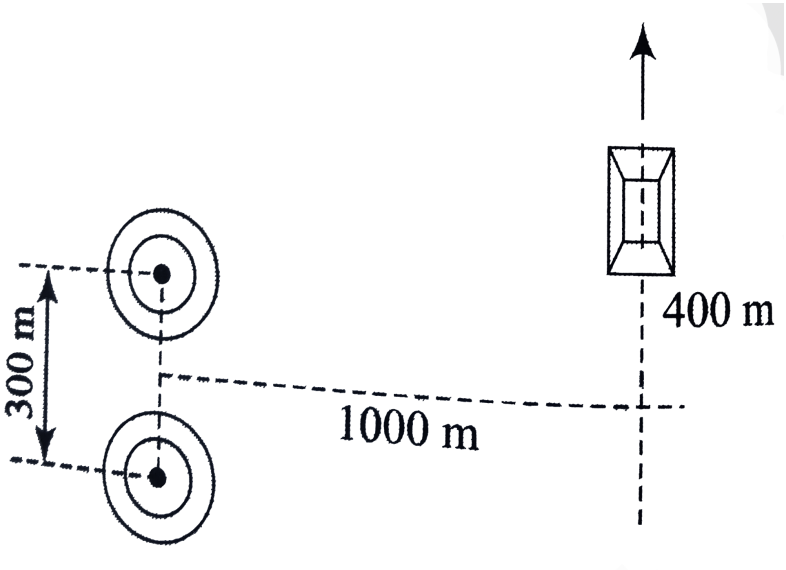
D. 30-300 Hz

Answer: A

Watch Video Solution

55. Two radio antennas separated by 300 m as shown in figure simultaneously broadcast indentical singals at the same wavelength. A radio in a car traveling due north receives the signals. (a) If the car is at the position of the second maximum, what is the wavelength of the signals? (b) How much farther must the car travel to encounter the next mininum in reception? (Note: Do not use the small- angle approximation

in this problem.)



A. orient the receiving antenna horizontally,north-south

B. orient the receiving antenna horizontally, east-west

C. use a vertical receiving antenna

D. Move to a town farther to the east or to the west,Use a magnetic dipole antenna instead of an electric dipole entenna.

Answer: D

Watch Video Solution

56. Which of these statements correctly describes the orientation of the electric field $\left(\vec{E}\right)$ the magnetic field $\left(\vec{B}\right)$ and velocity of propagation $\left(\vec{v}\right)$ of an electromagnetic wave?

A. $\vec{E}$ is perpendicular to $\vec{B}$, $\vec{v}$ may have any orientation relative to $\vec{E}$.

B. $\vec{E}$ is perpendicular to $\vec{B}$, $\vec{v}$ may have any orientation perpendicular to $\vec{E}$

C. $\vec{E}$ is parallel to $\vec{B}$, $\vec{v}$ is perpendicular to both $\vec{E}$ and $\vec{B}$

D. Each of the three vactor is perpendicular to the other two.

Answer: D

Watch Video Solution

57. A dipole radio transmitter has its rod-shaped antenna oriented vertically. At a point due south of the transmitter, the radio waves have their magnetic field.

A. oriented north-south

B. oriented east-west

C. oriented vertically

D. oriented in any horizontal direction.

Answer: B

Watch Video Solution

58. A vertical electric dipole antenna

A. radiates uniformly in all direction

B. radiates uniformly in all horizontal direction but more strongly in the vertical direction.

C. radiates most strongly and uniformly in the horizontal directions.

D. Does not radiate in the horizontal directions

Answer: C

Watch Video Solution

59. The amplitude of electric field in a parallel light beam of intensity $4Wm^{-2}$ is

A. $35.5NC^{-1}$

B. $45.5NC^{-1}$

C. $49.5NC^{-1}$

D. $55.5NC^{-1}$

Answer: D

Watch Video Solution

60. Consider the following two statements regarding a linearly polarized, plane electromagnetic wave:

The electric field and the magnetic field have equal average values.

The electric energy and the magnetic energy have equal average values.

A. Both a and b are true

B. a is false but b is true

C. b is false but a is true

D. both a and b are false

Answer: B

Watch Video Solution

61. Instantaneous displacement current of 1.0 A in the space between the paraller plates of $1\mu F$ capacitor can be established by changing potenial difference of:

A. $10^{-6}V/s$

B. $10^{6}V/s$

C. $10^{-8}V/s$

D. $10^{8}V/s$

Answer: B

Watch Video Solution

62. A place electromagnetic wave

$$F_s = 100\cos\left(6 \times 10^8 t + 4x\right) V/m$$

Propagates in a medium of dielectric constant. The refractive index is

A. 1.5

B. 2

C. 2.4

D. 4

Answer: D

Watch Video Solution

63. A larger parallel plate capactior, whose plates have an area of $1m^2$ are separated each other by 1 mm, is the plates has the dielectric constant 10 , then the displacement current at this instant is:

A. $25\mu A$

B. $11\mu A$

C. $2.2\mu A$

D. $1.1\mu A$

Answer: C

Watch Video Solution

64. The rms value of the electric field of the light from the sun is $720N/C$ The total energy density of the electromagnetic wave is

A. $4.58 \times 10^{-6} J/m^3$

B. $6.37 \times 10^{-9} J/m^3$

C. $81.35 \times 10^{-12} J/m^3$

D. $3.3 \times 10^{-3} J/m^3$

Answer: A

Watch Video Solution

65. A beam of light travelling along x-axis is described by the electric field,

$E_y = \left(600 V m^{-1}\right) \sin \omega (t - x/c)$

Calculating the maximum electric and magnetic forces on a charge q=2e, moving along y-axis with a speed of $3 \times 10^7 m/s$, where $e = 1.6 \times 10^{-19} C$.

A. $19.2 \times 10^{-17} N$

B. $1.92 \times 10^{-17} N$

C. $0.192 N$

D. none of these

Answer: B

Watch Video Solution

66. A plane electromagnetic wave travels in free space along x-axis. At a particular point in space, the electric field along y-axis is $9.3Vm^{-1}$. The magnetic induction (B) along z-axis is

A. $3.1 \times 10^{-8}T$

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

C. $3.1 \times 10^{-6}T$

D. $9.3 \times 10^{-6}T$

Answer: A

Watch Video Solution

67. A plane e.m. wave travelling along the x-direction has a wavelength of 3mm. The variation in the electric field occurs in the y-direction with an

amplitude $66Vm^{-1}$. The equation for the electric and magnetic fields as a function of x and t are respectively

A.

$$E_y = 33\cos\pi \times 10^{11}\left(t - \frac{x}{c}\right), B_z = 1.1 \times 10^{-7}\cos\pi \times 10^{11}\left(t - \frac{x}{c}\right)$$

B.

$$E_y = 11\cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right), B_y = 11 \times 10^{-7}\cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right)$$

C.

$$E_x = 33\cos\pi \times 10^{11}\left(t - \frac{x}{c}\right), B_x = 11 \times 10^{-7}\cos\pi \times 10^{11}\left(t - \frac{x}{c}\right)$$

D.

$$E_y = 66\cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right), B_z = 2.2 \times 10^{-7}\cos 2\pi \times 10^{11}\left(t - \frac{x}{c}\right)$$

Answer: D

Watch Video Solution

68. A digital signal-

A. is less reliable than analog signal

B. is more reliable than analog signal

C. is equally reliable as the analog signal

D. none of the above.

Answer: B

Watch Video Solution

69. Audio signal cannot be transmitted because

A. can be sent directly over the air for large distance

B. cannot be sent directly over the air for large distance

C. possess very high frequency

D. none of the above

Answer: B

Watch Video Solution

70. The process of changing some characteristic of a carrier wave in accordance with the intensity of the signal is called.

A. amplification

B. rectification

C. modulation

D. none of these

Answer: C

Watch Video Solution

71. In amplitude modulation

A. only the amplitude is changed but frequency remains same

B. both the amplitude and frequency change equally

C. both the amplitude and frequency change unequally

D. none of these

Answer: A

Watch Video Solution

72. Modulation factor determines-

A. only the strength of the transmitted signal

B. only the quality of the transmitted signal

C. both the strength and quality of the signal

D. none of the above

Answer: C

Watch Video Solution

73. Degree of modulation-

A. can take any value

B. should be less than 100%

C. should exceed 100%

D. none of these

Answer: B

Watch Video Solution

74. if the maximum and minimum voltage of AM wave are $V_{\max}$ and $V_{\min}$, respectively then modulation factor

A. $m = \dfrac{V_{\max}}{M_{\max} + V_{\min}}$

B. $m = \dfrac{V_{\min}}{V_{\max} + V_{\min}}$

C. $m = \dfrac{V_{\max} + V_{\min}}{V_{\max} - V_{\min}}$

D. $m = \dfrac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}}$

Answer: D

Watch Video Solution

75. The AM wave contans three frequencies viz:

A. $\frac{f_c}{2}, \frac{f_c + f_s}{2}, \frac{f_c - f_s}{2}$

B. $2f_c 2(f_c + f_s), 2(f_c - f_s)$

C. $f_c, (f_c + f_s), (f_c + f_s)$

D. f_c, f_c, f_c

Answer: C

Watch Video Solution

76. Which of the following is/are the limitations of amplitude modulation?

A. Clear reception

B. High efficiency

C. small operating range

D. good audio quality

Answer: C

Watch Video Solution

77. The frequency above which radiation of electrical energy is practical is

A. 0.2 kHz

B. 2 kHz

C. 20 kHz

D. 10 kHz

Answer: C

Watch Video Solution

78. For a carrier frequency of 100 kHz and a modulating frequency of 5kHz what is the width of AM transmission-

A. 5 kHz

B. 10 kHz

C. 20 kHz

D. 200 kHz

Answer: B

Watch Video Solution

79. In which of the region of earth's atmosphere temperature decreases with height?

A. Ionosphere

B. stratosphere

C. troposphere

D. mesosphere

Answer: C

Watch Video Solution

80. In an amplitude modulated wave for audio frequency of $500\text{cycle}/\sec ond$,the appropriate carrier frequency will be

A. 50 cycles/sec

B. 100 cycles/sec

C. 500 cycles/sec

D. 50,000cycles/sec

Answer: D

Watch Video Solution

81. The T.V. transmission tower in Delhi has a height of 240 m. The distance up to which the broadcast can be received, (taking the radius of earth to be $6.4 \times 10^6 m$) is

A. 100 km

B. 60 km

C. 55 km

D. 50 km

Answer: C

Watch Video Solution

82. Range of frequencies allotted for commercial FM radio broadcast is

A. 88 to 108 MHz

B. 88 to 108 kHz

C. 8 to 88 MHz

D. 88 to 108 GHz

Answer: A

Watch Video Solution

83. For a carrier frequency of 100 kHz and a modulating frequency of 5kHz what is the width of AM transmission-

A. 5 kHz

B. 10 kHz

C. 20 kHz

D. 200 kHz

Answer: B

Watch Video Solution

84. A vernier callipers having 1 main scale division $= 0.1cm$ to have a least count of $0.02cm$.If n be the number of divisions on vernier scale and m be the length of vernier scale, then.

A. n=10,m=0.5 cm

B. n=9, m=0.4 cm

C. n=10, m=0.8 cm

D. n=10,m=0.2 cm

Answer: C

Watch Video Solution

85. In a vernier callipers, N divisions of the main scale coincide with $N + m$ divisions of the vernier scale. what is the value of m for which the instrument has minimum least count.

A. 1

B. N

C. Infinity

D. N/2

Answer: A

Watch Video Solution

86. In the searle's experiment, after every step of loading, why should we wait for two minutes before taking the reading?(More than one options may be correct).

A. so that the wire can have its desired change in length

B. so that the wire can attain room temperature.

C. So that vertical oscillations can get subsided.

D. so that the wire has no change in its radius.

Answer: A::B::C

Watch Video Solution

87. In a meter bridge set up, which of the following should be the properties of the one meter long wire?

A. High resistivity and low temperature coeffcient

B. Low resistivity and low temperature coefficient

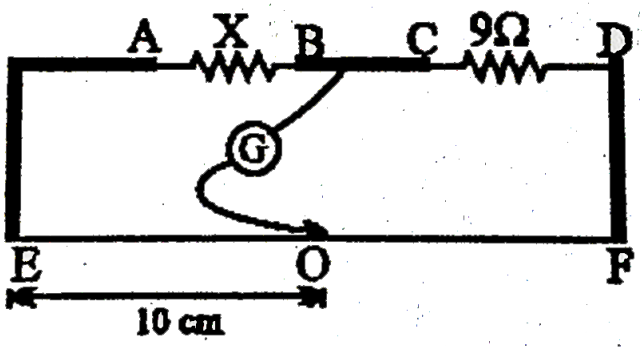
C. Low resistivity and high temperature coefficient

D. high resistivity and high temperature coefficient

Answer: A

Watch Video Solution

88.



Consider the MB shown in the diagram, let the resistance X have temperature coefficient α_1 and the resistance from the RB have the temperature coefficient α_2. Let the reading of the meter scale be 10 cm from the LHS. if the temperature of the two resistance increase by small temperature ΔT then what is the shift in the position of the null point ? Neglect all the other changes in the bridge due to temperature rise.

A. $(9\alpha_1 - \alpha_2)\Delta T$

B. $9(\alpha_1 + \alpha_2)\Delta T$

C. $\frac{1}{9}(\alpha_1 + \alpha_2)\Delta T$

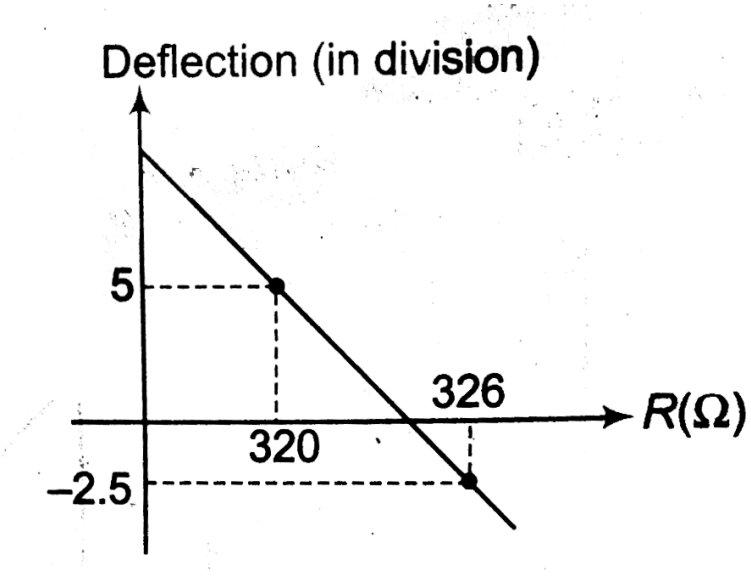
D. $\frac{1}{9}(\alpha_1 - \alpha_2)\Delta T$

Answer: A

Watch Video Solution

Watch Video Solution

89. For a post office box, the graph of galvanometer deflection versus (R) (resistance pulled out of resistance box) for the ratio $100:1$ is given as shown. Find the value of unknown resistance.



A. 3.2 ohm

B. 3.24 ohm

C. 3.206 ohm

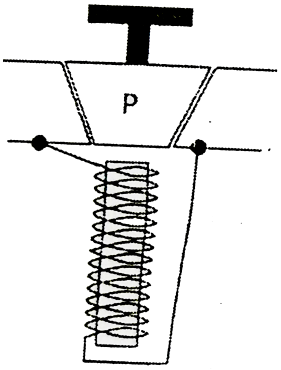
D. 3.26 ohm

Answer: B

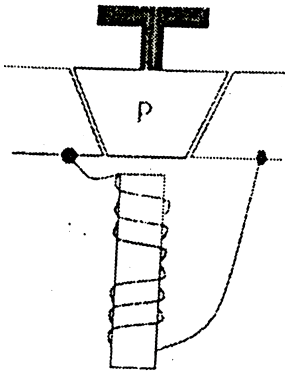
Watch Video Solution

90. Identify which of the following diagrams represent the internal construction of the coils wound in a resistance box or PO box ?

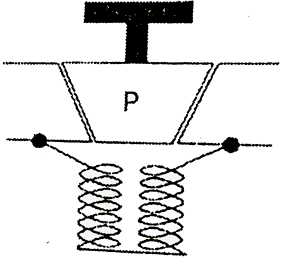
A.



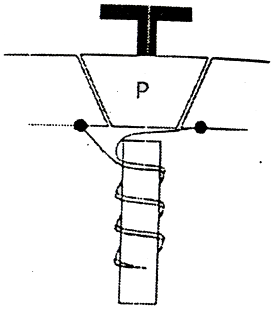
B.



C.



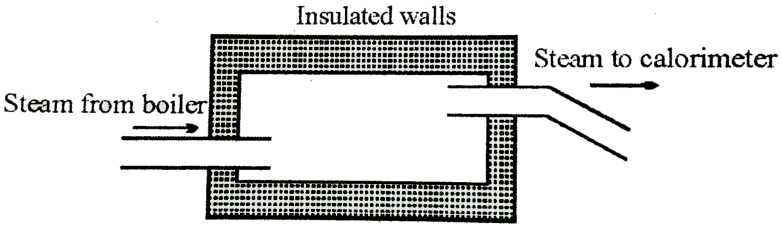
D.



Answer: D

Watch Video Solution

91.



In the laboratory method for measuring the latent heat of stream, the

steam is passed through the device shown below. The function of the device is

A. to prevent condensed steam from reaching the calorimenter

B. to reduce the pressure the steam

C. to ensure that thhe pressure of the steam is equal to the atmospheric pressure

D. to control the rate of flow of steam

Answer: A

View Text Solution

92. Using meter bridge, it is advised to obtain the null point in the middle of bridge wire. Why?

A. reduces systematic error as well as random error

B. reduces systematic error but not the random error.

C. Reduces random error but not the systemeatic error

D. reduces neither systematic error nor the random error.

Answer: A

Watch Video Solution

93. An approximate value of number of second in an year is $\pi \times 10^7$. Determine the % error in this value.

A. $0.5\ \%$

B. $8\ \%$

C. $4\ \%$

D. $14\ \%$

Answer: A

Watch Video Solution

94. To study the dissipations of the energy of a simple pendulum, student plots a graph between square root of time and amplitude . The graph would be a

A. ticker timer

B. meter scale

C. paper tape

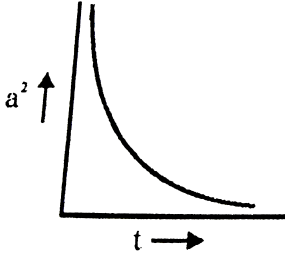
D. stop watch

Answer: D

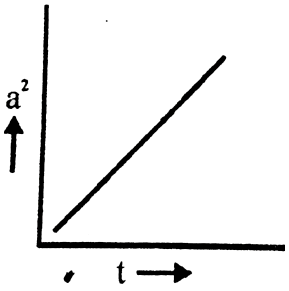
Watch Video Solution

95. For a simple pendulum the graph between length and time period will be

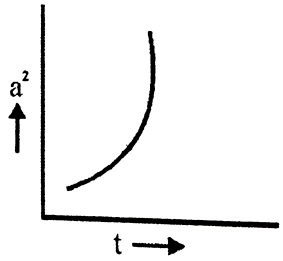
A.



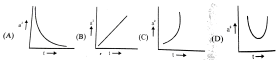
B.



C.



D.



Answer: A

Watch Video Solution

96. Amplitude of vibrations of simple pendulum is A. becomes $\frac{A}{3}$ after 20 seconds. The amplitude after 60 seconds will be-

A. $\frac{A}{6}$

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

C. $\frac{A}{9}$

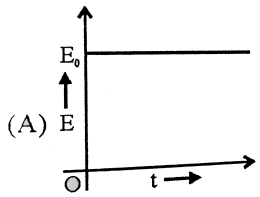
D. $\frac{A}{27}$

Answer: D

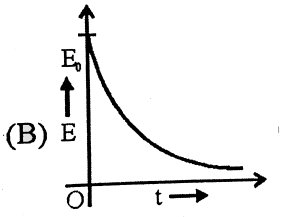
Watch Video Solution

97. Variation of energy of the bob E moving in viscous medium as function of time t is shown graphically as

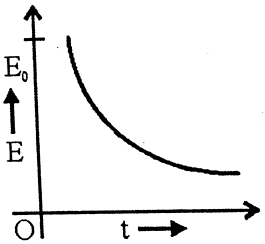
A.



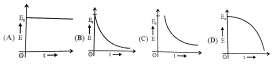
B.



C.



D.



Answer: B

Watch Video Solution

98. The inner diameter of a cylinderical wooden pipe is 24 cm and its outer diameter is 28 cm. The length of the pipe is 35 cm. Find the mass of the pipe, if $1cm^3$ of wood has a mass of 0.6 g.

A. 42.5 g

B. 42.3 g

C. 24.8 g

D. 24.5 g

Answer: D

Watch Video Solution

99. In searle's apparatus we have two wires. During experiment we study the extension in one wire the use of second wire is

A. to support the apparatus because it is heavy and may not break sigle wire

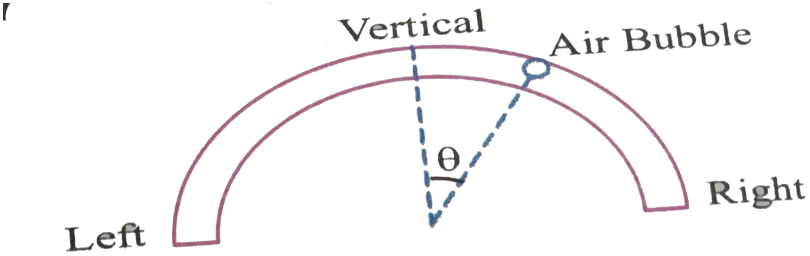
B. to compensate the changes in length caused by changes in temperature of atmosphere during experimentation

C. to keep the apparatus in level so that extension is measured accurately

D. all the three above

Answer: B

Watch Video Solution



100.

A glass tube filled with colored water, sealed at both the ends is bent into an arc. There is a small air bubble inside. The tube is held with its plane vertical. When the tube moves with constant acceleration either of left or right the bubble shifts and settles at some plane either to the left or right of the highest point. For the situation shown, what can you conclude about acceleration vector of the tube?

A. right towards experimental wire

B. towards compensating wire towards either of them

C. dows not shift

D.

Answer: B

Watch Video Solution

101. The teacher allows all the students of a class of perform the experiment to determine the Young's modulus of elasticity with the same experimental wire. It does not give correct result to the last student because of

A. elastic limit

B. elastic fatigue

C. platicity

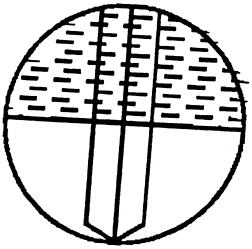
D. permanent set

Answer: B

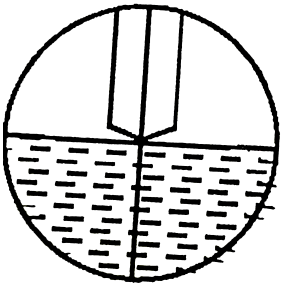
Watch Video Solution

102. A tank is filled with water to a height of $12.5cm$ The apparent depth of a needle lying at the bottom of the tank is measured by a microscope to be $9.4cm$. What is the refractive index of water ? If water is replaced by a liquid of refractive index 1.63 upto the same height, by what distance would the microscope have to be moved to focus on the needle again ?

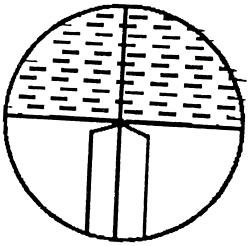
A.

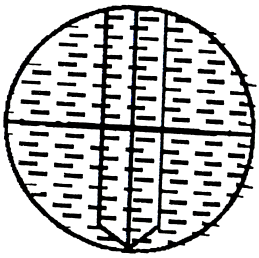


B.



C.



D. 

Answer: C

Watch Video Solution

103. While performing the experiment to find out the surface tension of water, ajay got the height of the water 6 cm during water. Repeating the same experiment during summer, the weight would be

A. $h > 6$

B. h=6

C. $h < 6$

D. h=12

Answer: C

Watch Video Solution

104. To observe, how is the surface tension of water affected on dissolving a detergent in it experimentally, student must observe that-

A. pure water rises to a heigher level in the same capillary tube whereas detergent solution rises to a lesser height

B. the height of detergent solution is more than the rise of water in an identical capillary tube

C. same rise of water and detergent solution in both the tubes

D. water rises in the capillary tube but detergent solution depressed in the tube

Answer: A

Watch Video Solution

105. Define coefficient of viscosity ?

A. centrally dropped in the glass jar

B. dropped along the calibrated side of glass jar

C. dropped along the opposite side of calibrations

D. dropped in any manner but slowly

Answer: A

Watch Video Solution

106. A small steel ball of mass m and radius r is falling under gravity through a viscous liquid of coefficient of viscosity η. If g is the value of acceleration due to gravity. Then the terminal velocity of the ball is proportional to (ignore buoyancy)

A. the balls should be kept absolutely dry before dropping them

B. the balls should be rinsed with acetylene

C. the balls should be wetted with the used viscous liquid

D. the ball should be dropped gently

Answer: C

Watch Video Solution

107. While measuring the speed of sound by performing a resonance column experiment, a student gets the first resonance condition at a column length of $18cm$ during winter. Repeating the same experiment during summer, she measures the column length to be xcm for the second resonance. Then

A. xgt54

B. $54 > x36$

C. $36 > x > 18$

D. $18 > x$

Answer: A

Watch Video Solution

108. To find the value of resistance R using Ohm's law, we are given four voltmeters as below. Which one will you prefer to be connected in the circuit?

A. 1.5 V, $10,\ 000\Omega$

B. 2.0 V, $20,\ 000\Omega$

C. $1.5V, 1000\Omega$

D. $10V, 20,\ 000\Omega$

Answer: B

Watch Video Solution

109. In above question which ammeter will you prefer?

A. $1A, 10\Omega$

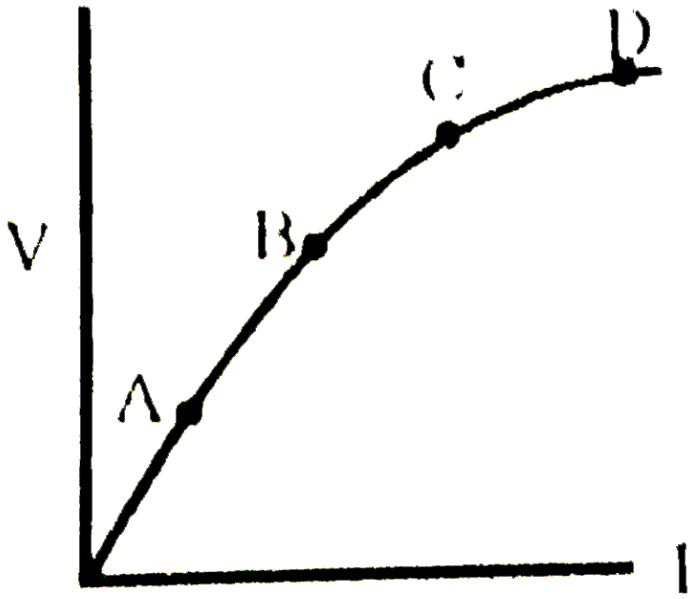
B. $2A, 0.01\Omega$

C. $1A, 0.001\Omega$

D. $10A, 1\Omega$

Answer: C

Watch Video Solution



110.

Variation of current passing through a conductor as the voltage supplied

across its ends as varied is shown in the adjoining diagram. If the resistance (R) is determined at the points A, B, C and D we will find that-

A. $R_C = R_D$

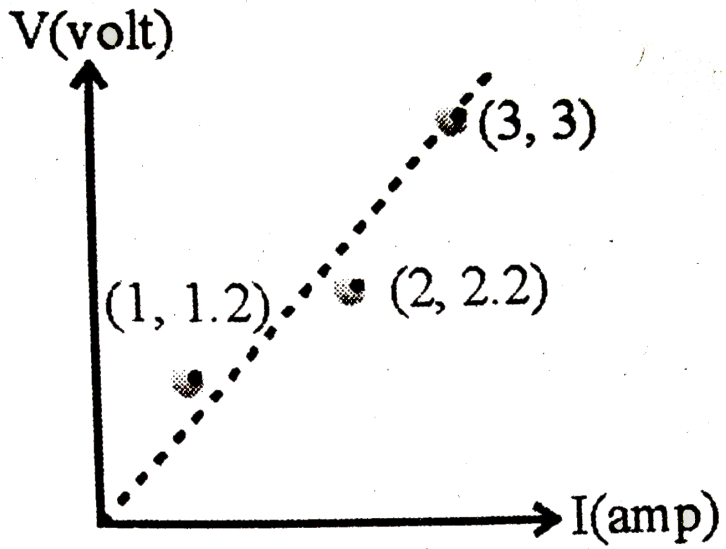
B. $R_B > R_A$

C. $R_C > R_B$

D. $R_A > R_C$

Answer: D

Watch Video Solution



111.

In the measurement of resistance of a wire using Ohm's, the plot between V and I is drawn as shown. The resistance of the wire is-

A. 0.833Ω

B. 0.9Ω

C. 1Ω

D. None of these

Answer: C

Watch Video Solution

112. A device whose one end is connected to $-ve$ terminal and other end connected to $+ve$ terminal. If both ends are interchanged with suppy then current is not flowing then device will be-

A. correct

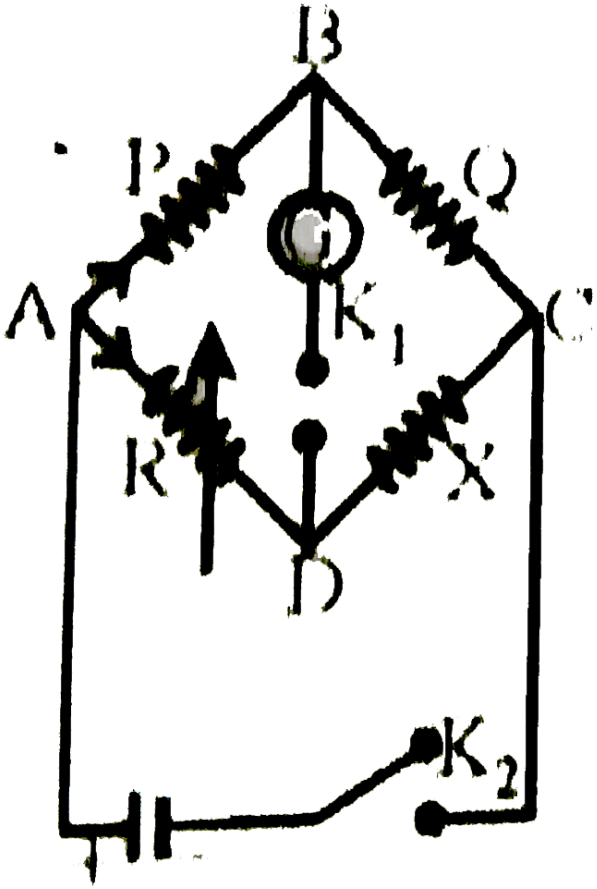
B. terminals of ammeter be reversed

C. terminals of voltmeter be reversed

D. terminals of ammeter and voltmeter may be connected in any order

Answer: A

 Watch Video Solution



113.

In Wheatsone bridge experiment as shown in figure-

A. Key K_1 should be pressed first and then K_2

B. Key K_2 should be pressed first and then K_1

C. any key can be pressed in any order

D. both keys should be pressed simultaneously.

Answer: B

View Text Solution

114. In a meter bridge experiment, the null point is obtained at $20cm$from one end of the wire when resistance X is balanced against another resistance Y. If $X < Y$, then where will be the new position of the null point from the same end, if one decides to balanced a resistance of $4X$ against Y?

A. 50 cm

B. 80 cm

C. 40 cm

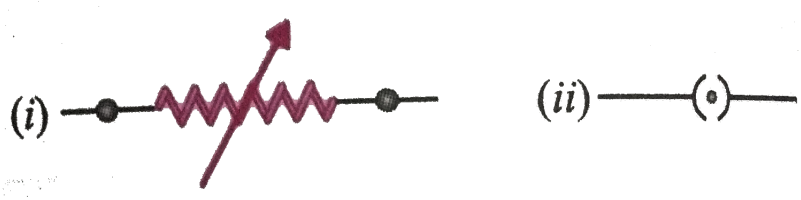
D. 70 cm

Answer: A

Watch Video Solution

115. (a) Name an instrument that measures electric current in a circuit. Define the unit of electric current.

(b) What do the following symbols, (Fig. 3.58) mean in a circuit diagram ?



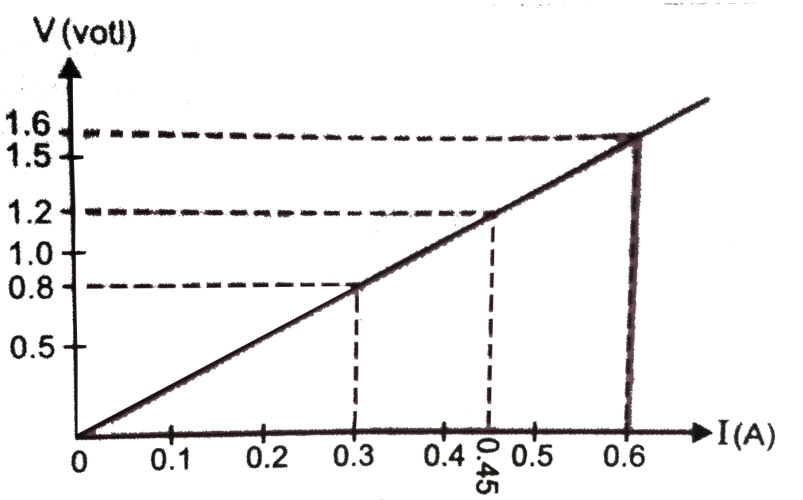
(c) An electric circuit consisting of a $0.5m$ long nichrome wire XY, an ammeter, a voltmeter, four cells of $1.5V$ each and a plug key was set up.

(i) Draw a diagram of this electric circuit to study the relation between the potential difference maintained between the points X and Y and the electric current flowing through XY.

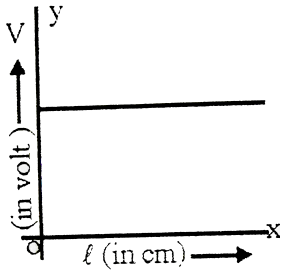
(ii) Graph shown in (Fig. 3.59) was plotted V and I values.

What would be the values of V/I ratios when the potential differences are $0.8V, 1.2V$ and $1.6V$ respectively ? What conclusion do you draw

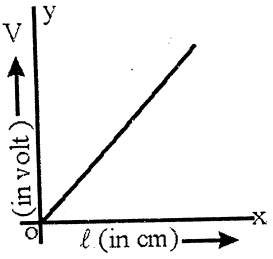
from these values ?



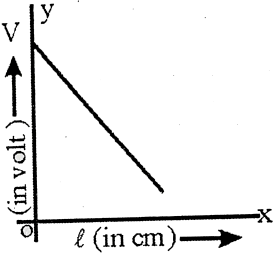
A.



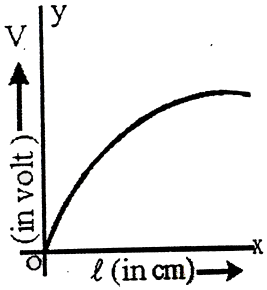
B.



C.



D.



Answer: B

Watch Video Solution

116. Potentiometer wire is made of manganin because it has

A. High specific resistace, low temperature coefficient

B. low specific resistace, high temperature coefficient

C. low specific resistance, low temperature coefficient

D. high specific resistance, high temperature coefficient

Answer: A

Watch Video Solution

117. Which of the following statements is wrong?

A. To increase sensitivity of a potentiometer increase current through potentiometer wire

B. to increase sensitivity increase external resistance in battery circuit connected to potentiometer

C. to increase sensitivity increase battery voltage

D. to increase sensitivity increase the emf of battery

Answer: B

Watch Video Solution

118. To measure the resistance of a galvanometer by half deflection method, a shunt is connected to the galvanometer . The shunt is

A. to bring the defection of galvanometer within the scale

B. to minimize power loss

C. because high resistances are easily available

D. none of these

Answer: A

Watch Video Solution

119. In an ammeter, 10% of the main current is passing through galvanometer, if the galvanometer is shunted with a 10 Ω resistance. What is the resistance of the galvanometer ?

A. almost same of the previous value

B. double of the previous value

C. half of the previous

D. exactly same of the previous value

Answer: C

Watch Video Solution

120. What would you do to obtain a large deflection of the galvanometer?

A. the shunt resistance shuold be increased

B. the shunt resistance should be decrease

C. should check the connections

D. should change the keys used by him

Answer: B

Watch Video Solution

121. A galvanometer of resistance 3663Ω gives full scale deflection for a certain current I_g. The value of the resistance of the shunt which when joined to the galvanometer coil will result in $1/34$ of the total current passing through the galvanometer is

A. $2 \times 10^{-4} A / \div$

B. $5 \times 10^{-6} A / \div$

C. $5 \times 10^{-2} A / \div$

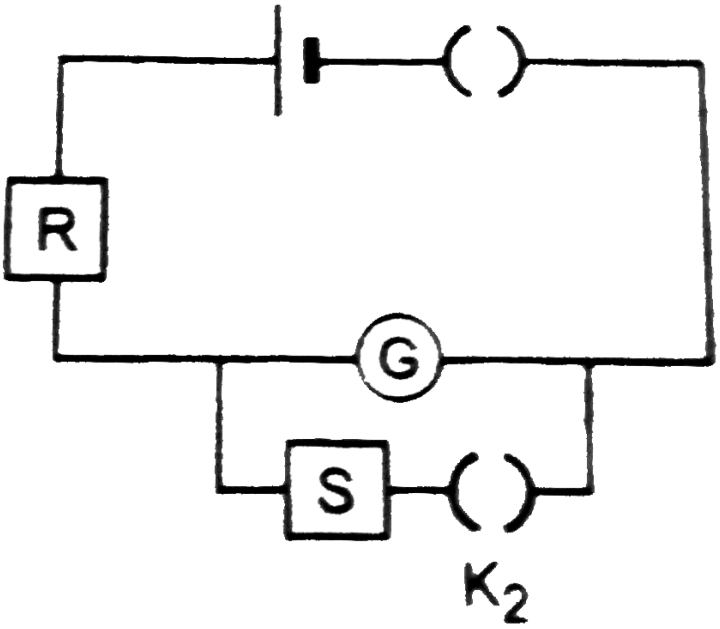
D. $2 \times 10^{5} A / \div$

Answer: B

Watch Video Solution

122. In the circuit, shown in figure. $R = 5000\Omega$. If key K_1 is closed, galvanometer shows a deflection of 30 scale division. On closing key K_2 and making $S = 20\Omega$, the deflection of galvanometer reduces to 15

division. The resistance of galvanometer is



A. 56Ω

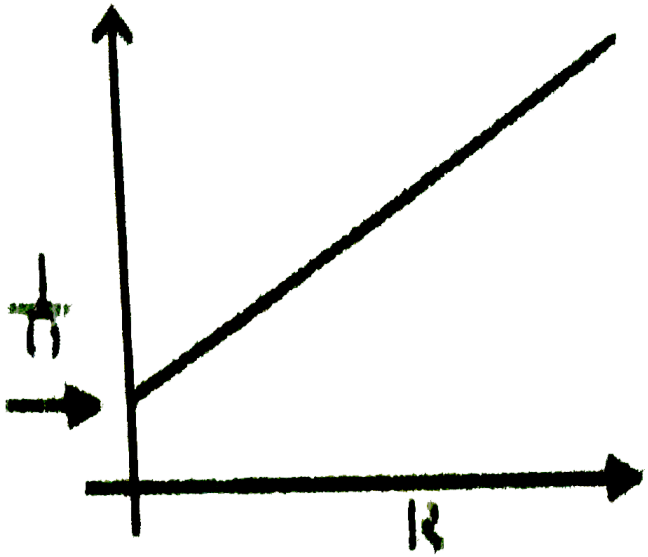
B. 60Ω

C. 64Ω

D. 940Ω

Answer: C

Watch Video Solution



123.

A student plots a graph between the resistance R and the reciprocal of deflection θ for the give galvanometer. The graph obtained is as shown in figure. From the graph he can calculate the resitance of galvanometer as

A. ratio of slope to intercept

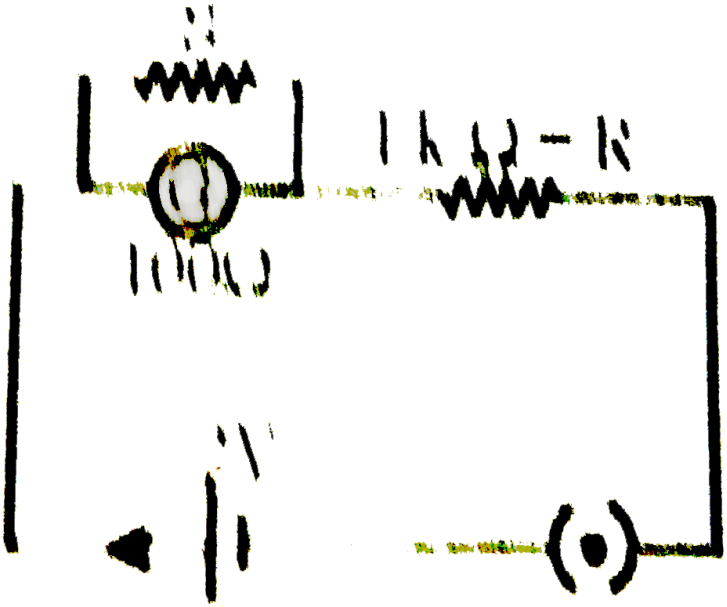
B. ratio of intercept to slope

C. product of slope and intercept

D. galvanometer resistance can not be calculated from it.

Answer: B

View Text Solution



124.

A galvanometer is connected as shown in figure. It has resistance 100Ω. What should be the resistance connected to it in parallel so that its deflection is reduced to half?

A. 100Ω

B. 99Ω

C. 91Ω

D. 90Ω

Answer: C

View Text Solution

125. Which of the following statements is false

A. The bench correction is always equal to the negative of bench error

B. larger the distance between the two object larger the magnitude of parallax

C. parallax disappear if the positions of two objects coincide

D. parallax can occur between any two object

Answer: B

Watch Video Solution

126. The focal length of a convex mirror is obtained by using a convex lens. The following observation are recorded during the experiment-

$$\begin{aligned}\text{object position} &= 5cm\\ \text{Image} &= 93.8cm\\ \text{Mirror} &= 63.3cm\\ \text{Bench error} &= -0.1cm\end{aligned}$$

Then the focal length of mirror will be

A. 7.5 cm

B. 8.4 cm

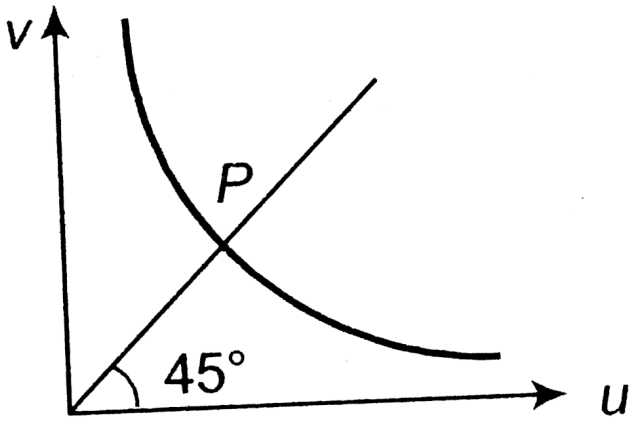
C. 15.3 cm

D. none of these

Answer: C

View Text Solution

127. The graph shows variation of v with change in u for a mirrorr. Points plotted above the point P on the curve are for values of v



A. smaller than f

B. smaller than 2f

C. larger than 2f

D. larger than f

Answer: C

Watch Video Solution

128. In an optics experiment, with the position of the object fixed, a student varies the position of a convex lens and for each position, the

screen is adjusted to get a clear image of the object. A graph between the object distance u and the image distance v, from the lens, is plitted using the same scale for the two axes. A straight line passing through the origin and making an angle of 45° with x-axis meets the experimental curve at P. The coordinates of P will be.

A. (2f,2f)

B. $\left(\frac{f}{2}, \frac{f}{2}\right)$

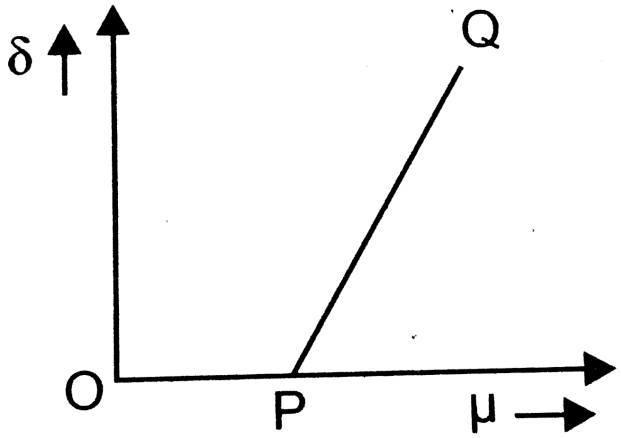
C. (f, f)

D. $(4f, 4f)$

Answer: A

Watch Video Solution

129. For a small angled prism, angle of prism A of minimum deviation(δ) varies with the refractive index of the prism as shown in the graph



A. Point P corresponds to $\mu = 1$

B. Slope of the line $PQ = A/2$

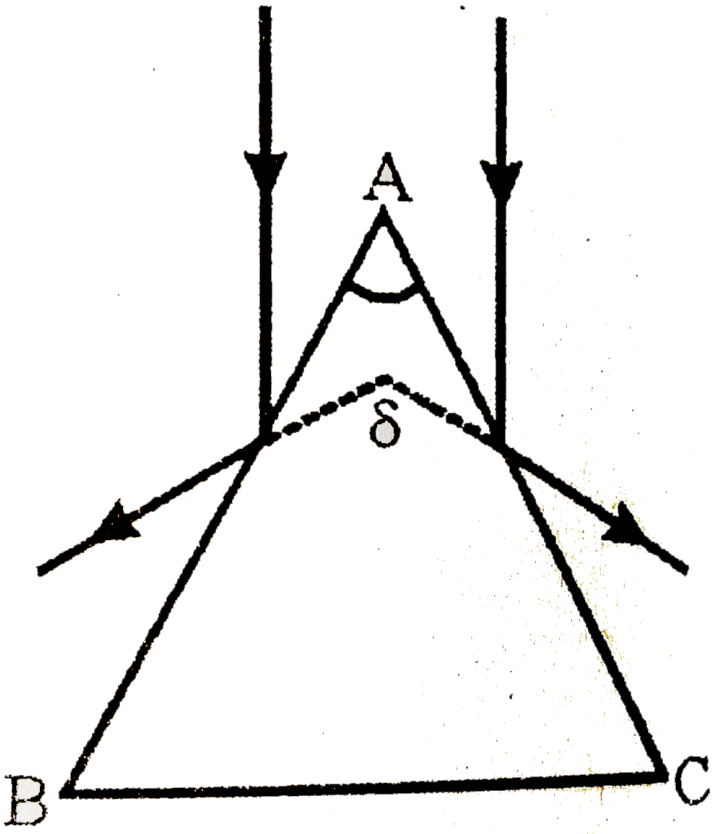
C. Slope=2A

D. None of the above statements is true

Answer: A

Watch Video Solution

130.



A parallel beam of light is incident on a prism as shown in figure. Such that the rays get reflected from opposite faces. The angle of deviation δ between reflected rays from faces AB and AC is-

A. A

B. $2A$

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

D. Non relation between A and δ

Answer: B

Watch Video Solution

131. An experment is performed to find the refractive index of glass using a travelling mircroscope. In this experiment distances are measured by

A. a standard laboratory scale

B. a meter scale provided on the microscope

C. a screw gauge provided on the microscope

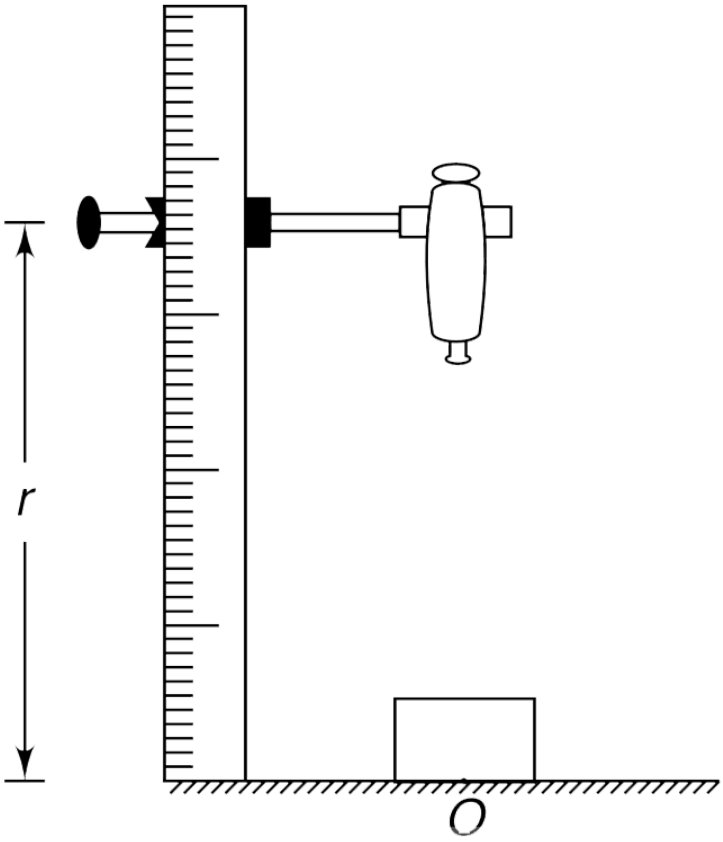
D. a vernier scale provided on the microscope

Answer: D

Watch Video Solution

132. A travelling microscope can move vertically along a scale. It is focused at a mark O on the table and the reading on the vertical scale isr_1. Now a glass slab is placed over mark O and the microscope has to be moved up to bring the mark in focus again. This time the scale reads r_2. Lycopodium powder is spread over the top of the glass slab and the microscope is moved up once again to bring the powder particles in sharp focus. This time the vertical scale reads r_3. Find the refractive index of the material

of the glass slab.



A. 15 cm

B. 5cm

C. 30 cm

D. 20 cm

Answer: A

Watch Video Solution

133. Calculate the index of refraction of a liquid from the following into glass:

(a) Reading for the bottom of an empty beaker: 11.324 cm

(b) Reading for the bottom of the beaker, when partially filled with the liquid: 11.802 cm

(c) Reading for the upper level of the liquid in the beaker: 12.895cm

A. 1.232

B. 1.389

C. 1.28

D. 1.437

Answer: D

Watch Video Solution

134. A convex lens is held $45cm$ above the bottom of an empty tank. The image of a point at the bottom of a tank is formed $36cm$ above the lens. Now, a liquid is poured into the tank to a depth of $40cm$. It is found that the distance of the image of the same point on the bottom of the tank is $48cm$ above the lens. Find the refractive index of the liquid.

A. 1.28

B. 1.82

C. 1.47

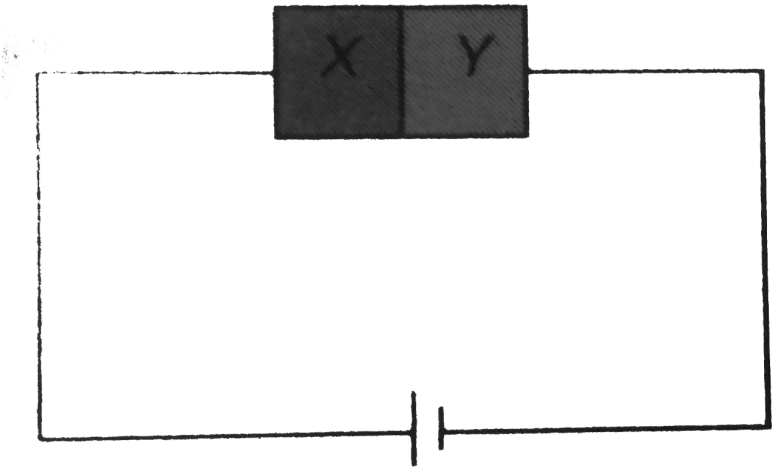
D. 3.12

Answer: C

Watch Video Solution

135. A semiconductor X is made by dopping a germanium crystal with arsenic $(Z = 33)$. A scond semiconductor Y is made by dopping germanium with indium $(Z = 49)$. The two are joined end to end and

connected to a battery as shown. Which of the following statements is correct?



A. X is P-type, Y is N-type and the junction is forward biased

B. X is N-type, Y is P-type and the junction is forward biased

C. X is P-type, Y is N-type and the junction is reverse biased

D. X is N-type, Y is P-type and the junction is reverse biased

Answer: D

Watch Video Solution

136. In a p- n junction diode not connected to any circuit,

A. the potential in the same every where

B. The P-type side is at higher potential then the N-type side

C. There is an electric field at the junction directed from the N-type side to the P-type side

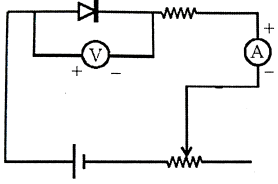
D. there is an electric field at the junction directed from the P-type to the N-type side.

Answer: C

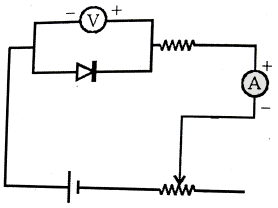
Watch Video Solution

137. Draw and explain the current -voltage (I-V) characteristic curves of a junction diode in forward and reverse bias.

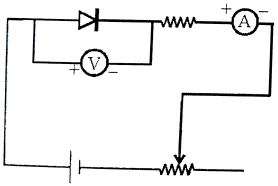
A.



B.



C.



D. None of these

Answer: D

Watch Video Solution

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

A. A P-type semiconductor

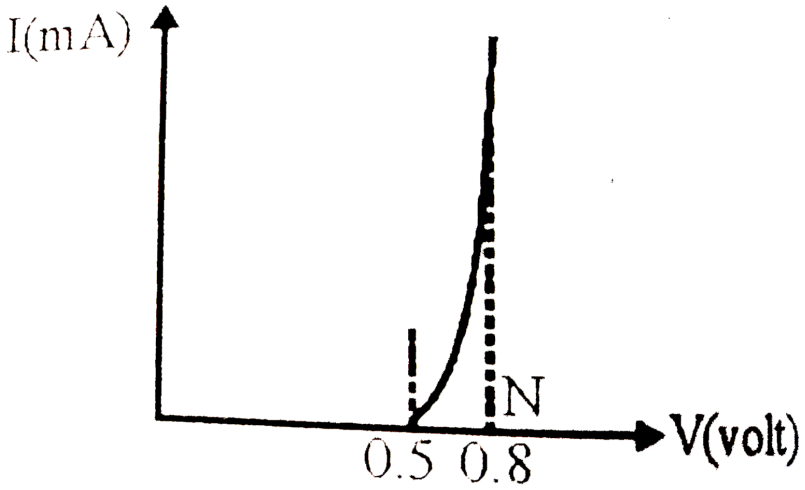
B. An N-type semiconductor

C. A P-N junction

D. An intrinstic semiconductor

Answer: C

Watch Video Solution



139.

The characteristic curve for a diode is shown in the figure for forward bias mode. The cut-off voltage for this diode is approximately-

A. 0.5 V

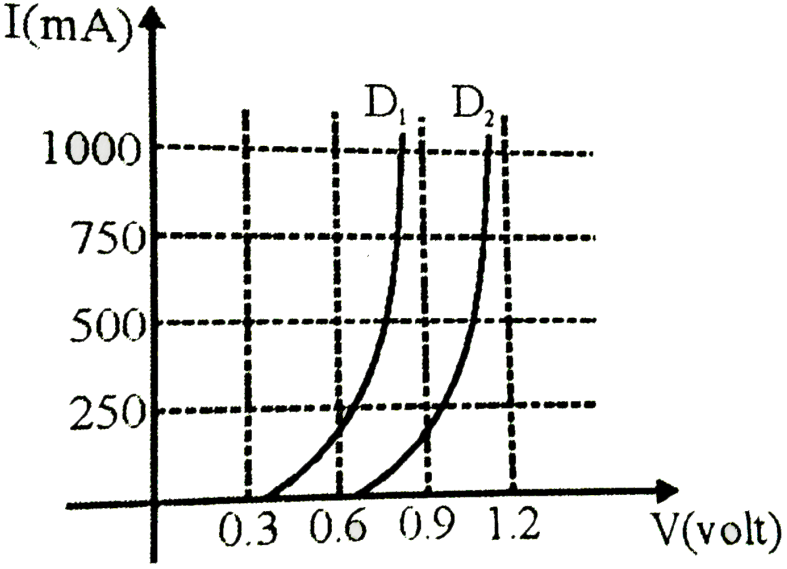
B. 0.8 V

C. 1 V

D. 0.1V

Answer: A

Watch Video Solution



140.

The forward bias characteristics of two diodes D_1 and D_2 are shown, the

knee voltage for D_1 and D_2 respectively [approx]-

A. 0.4 V and 0.7 V

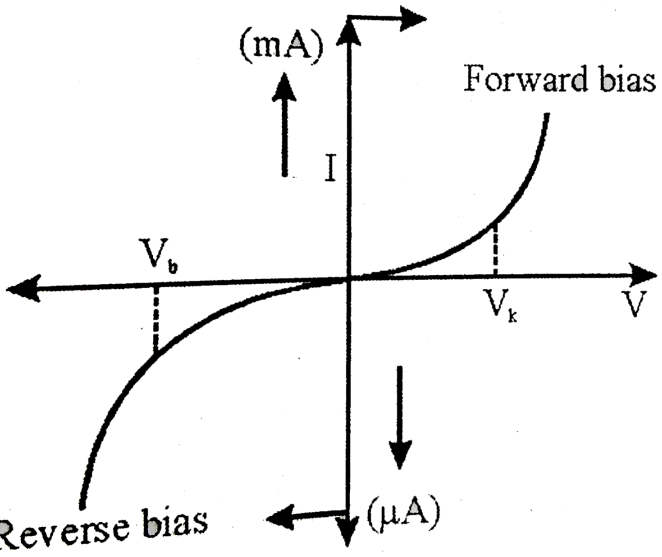
B. 0.6 V and 0.9 V

C. 0.6 V and 0.8 V

D. 0.4 V and 0.9 V

Answer: A

Watch Video Solution



141.

The V-I characterisctic for a p-n junction diode is plotted as shown in the figure. From the plot we can conclude that

[$V_b \rightarrow$ breakdown voltage, $V_k \rightarrow$ knee voltage]

A. the forward bias resistance of diode is very high, almost infinity for small values of V and after a certain value it becomes very low

B. the reverse bias resistance of diode is very high in the beginning upto breakdown voltage is not achieved

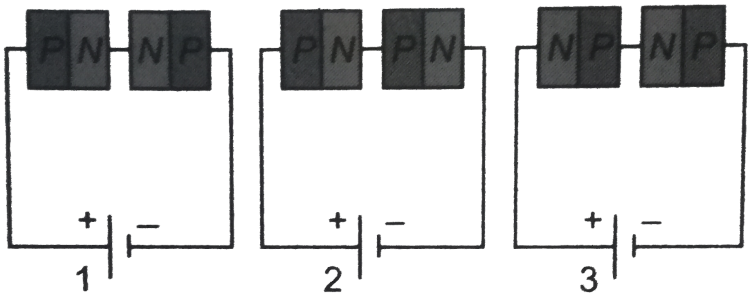
C. both forward and reverse bias resistances are same for all voltages

D. both (A) and (B) are correct

Answer: D

View Text Solution

142. Two PN-junction can be connected in series by three different methods as shown in the figure. If the potential difference in the junction is the same, then the correct connection will be



A. in the circuit (1) and (2)

B. in the circuit (2) and (3)

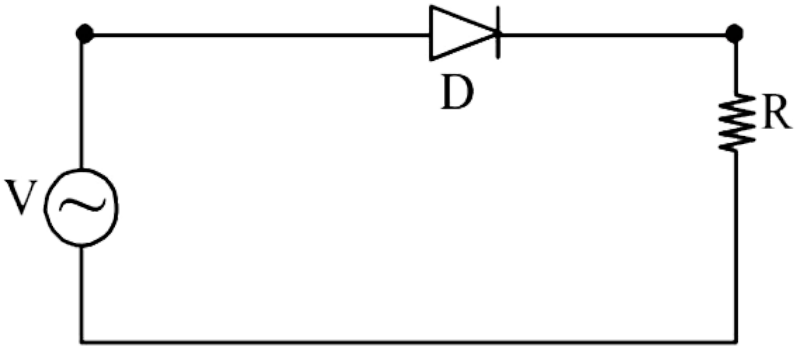
C. in the circuit (1) and (3)

D. only in the circuit (1)

Answer: B

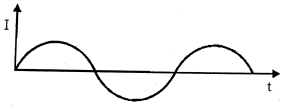
Watch Video Solution

143. a p -n juction (D) shown in the figure can act an a rectifier An alternatting current source (V) is connected in the circuit

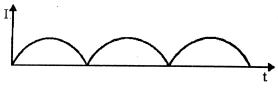


The corrent (I) in the resistor® can be shown by :

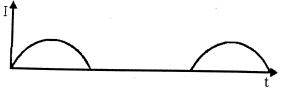
A.



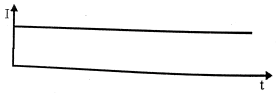
B.



C.



D.

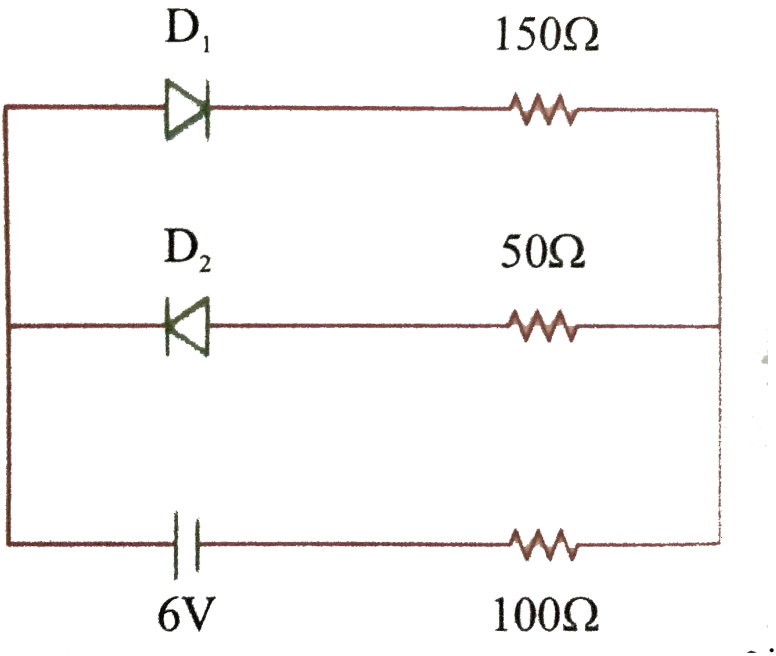


Answer: C

Watch Video Solution

144. The circuit shown in figure (1) Contains two diodes each with a forward resistance of $50ohm$ and with infinite reverse resistance. If the

battery voltage is $6V$, the current through the $100ohm$ resistance is.



A. zero

B. 0.02

C. 0.03

D. 0.036

Answer: B

Watch Video Solution

145. Zener diode is a p-n junction which has-

A. p-end heavily doped,n-end lightly doped

B. n-end heavily doped, p-end lightly doped

C. both p and n-ends heavily doped

D. both p and n-ends lightly doped

Answer: C

Watch Video Solution

146. Zener diode has both p and n-ends heavily doped so that-

A. it has small thickness of depletion region

B. it has large thickness of depletion region due to large recombination

C. it has large reverse bias voltage

D. it has weak reverse current when reverse biased

Answer: A

Watch Video Solution

147. Zener diode is a specially desined p-n junction diode, in which both p-side and n-side of p-n junction are heavily doped. The zener diode is designed especially to operate in the reverse break down voltage region continuosly without being damaged? Zener diode is used to remove the fluctuations from the given voltage and thereby provides a voltage of constant magnitude (i.e., Zener diode is used as voltage regulator).

Read the above pragraph and answer the following question:

(i) What is the most important use of Zener diode?

(ii) What are the essential conditions for proper working of Zener diode?

(iii) What do you learn from the above atudy?

A. Reverse bias voltage should be less than or equal to zener break down voltage

B. Reverse bias voltage applied must be greater than zener break down voltage

C. Zener is to be reverse biased for zener action

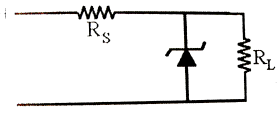
D. For given diode there can be different zener break down voltages.

Answer: B

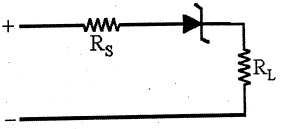
Watch Video Solution

148. A zener diode is to be used as a voltage regulator. Identify the correct set up.

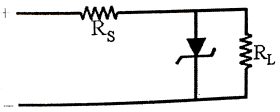
A.

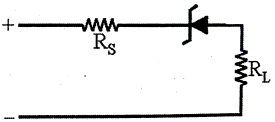


B.



C.

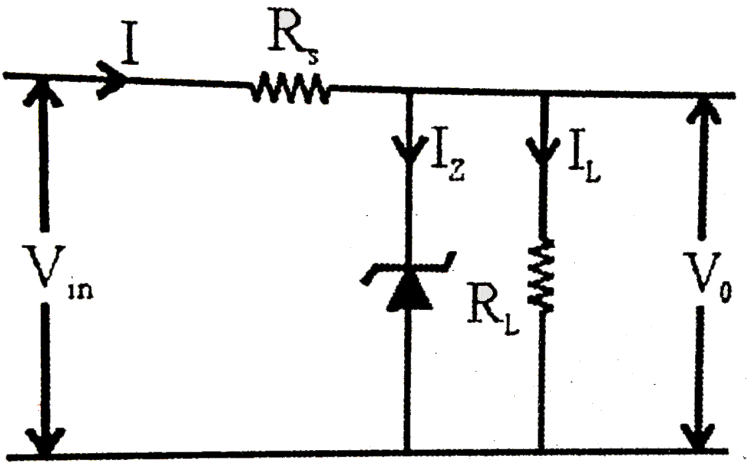




D.

Answer: A

Watch Video Solution



149.

In given figure when input voltage increases,

A. the current through R_S, R_L and zener incresases

B. the current through R_S increases, zener increases but through R_L remains constant

C. the current through R_S increases, through zener decreases, R_L increases

D. the current through R_S increases, through zener remains constant but R_L increases

Answer: B

View Text Solution

150. Zener diode is a specially desined p-n junction diode, in which both p-side and n-side of p-n junction are heavily doped. The zener diode is designed especially to operate in the reverse break down voltage region continuosly without being damaged? Zener diode is used to remove the fluctuations from the given voltage and thereby provides a voltage of constant magnitude (i.e., Zener diode is used as voltage regulator).

Read the above pragraph and answer the following question:

(i) What is the most important use of Zener diode?

(ii) What are the essential conditions for proper working of Zener diode?

(iii) What do you learn from the above atudy?

A. constant voltage across applied load

B. any desired current at constant voltage

C. a p-n junction working under constant regulated voltage conditions

D. a p-n junction to operate at high voltages.

Answer: A

Watch Video Solution

151. A transistor is used in common emitter mode as an amplifier. Then

(1) the base-emitter junction is forward biased

(2) the base emitter junction is reverse biased

(3) the input signal is connected in series with the voltage applied to the base-emitter junction.

(4) the input signal is connected in series with the voltage applied to the base collector junction.

A. the base emitter junction is forward biased

B. the base emitter junction is reverse biased

C. the input signal is connected in series with the voltage applied to bias the base emitter junction

D. the input signal is connected is series with the votlage applied to bias the base collector junction

Answer: A

Watch Video Solution

152. Which is correct

A. 1,2,3

B. 1,2,3,4

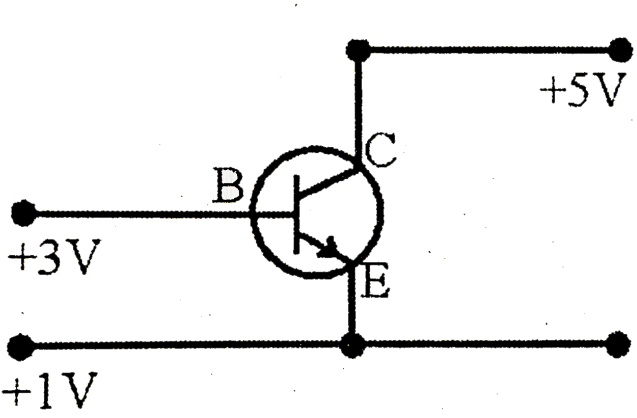
C. 1,3

D. 2,3,4

Answer: C

Watch Video Solution

153.



In given figure-

A. emitter is forward biased

B. collector is forward biased

C. emitter is reverse biased

D. emitter and collector both are reverse biased

Answer: A

View Text Solution

View Text Solution

154. In a transistor in CE configuration, the ratio of power gain to voltage gain is

A. Input characteristic is plotted between base current and base to emitter votlage keeping collector current constant.

B. Input characteristic is plotted between base current ad base to emitter voltage keeping collector to emitter voltage constant

C.

D.

Answer: B

Watch Video Solution

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

A. The potential divider on input side is used to keep V_{CE} constant while drawing input characteritics

B. The potential divider on output side is used to keep V_{CE} constant while drawing output characteristics

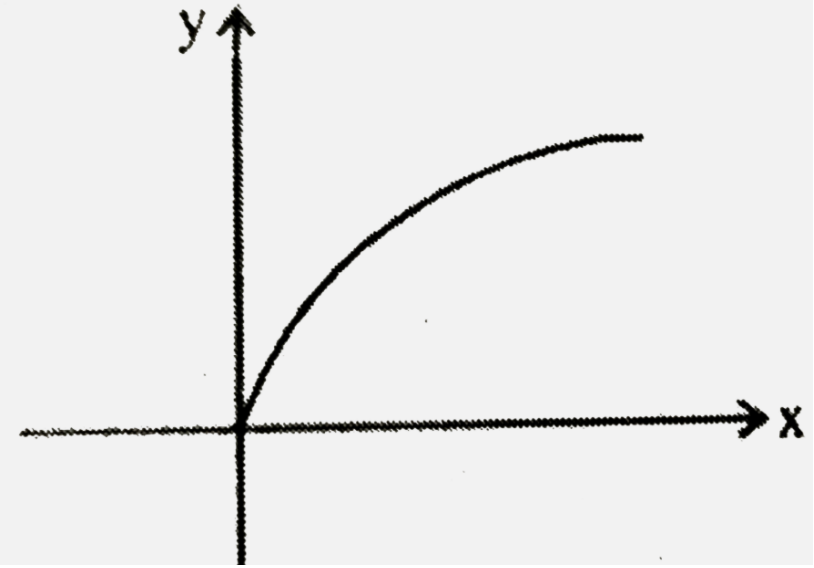
C. The potential divider on input side is used to keep base current constant while drawing output characteristics

D. Both (B) and (C) are correct

Answer: C

Watch Video Solution

156. Which is correct for the graph ?



A. $V_{CE_1} > V_{CE_2}$

B. $V_{CE_1} = V_{CE_2}$

C. $V_{CE_1} < V_{CE_2}$

D. none of these

Answer: C

Watch Video Solution

157. ट्रांजिस्टर के विभिन्न विन्यासो (configurations) का वर्णन करे ।

A. Input resistance is very large while output resistance is very small

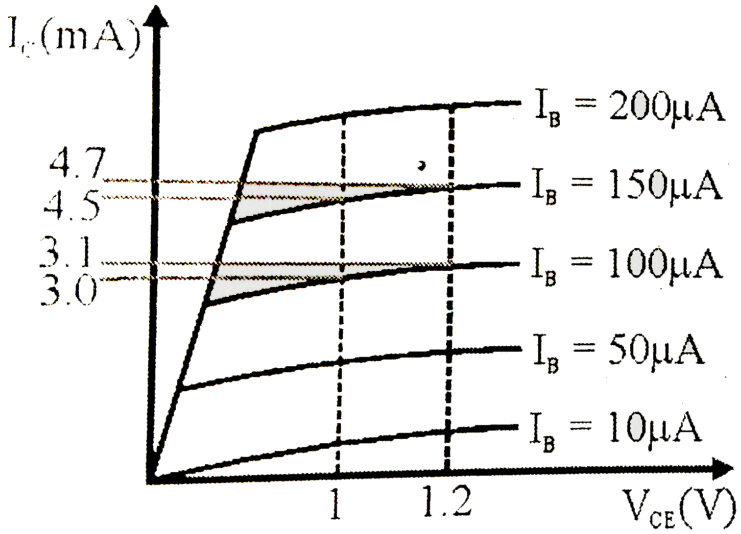
B. input resistance is very small while output resistance is very high

C. both input and output resistance are very small

D. both input and output resistances are very large

Answer: B

Watch Video Solution



158.

Output characteristic of n-p-n transistor in CE configuration is shown. From the characteristic curve determine the current gain at $V_{CE} = 1V$-

A. 30

B. 32

C. 28

D. 40

Answer: A

Watch Video Solution

159. In an n-p-n transistor circuit, the collector current is 20 mA. If 90 % of electron emitted reach the collector :-

A. the emitter current will be 9 mA.

B. the base current will be 9 mA

C. the emitter current will be 11 mA

D. the base current will be -1 mA

Answer: C

Watch Video Solution

160. Mark the correct statement(s)-

A. Diode, LED and transistor are two leg devices

B. Diode, LED and resistor are two leg devices

C. Transistor and IC are 3 leg devices

D. IC and transistor are having same number of legs but not three

Answer: B

Watch Video Solution

161. Continuity test is made with multimeter by keeping the selector switch ON at-

A. voltage position

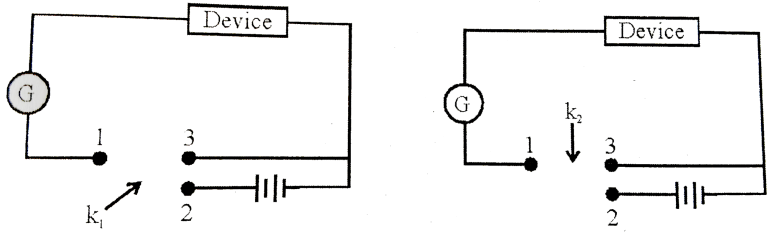
B. current position

C. resistace position

D. None of these

Answer: C

Watch Video Solution



162.

A two terminal when connected in series with a battery and a galvanometer in series with it through a two way key as shown in figure. The galvanometer shows maximum deflection which gradually decreases to zero, when key k_1 is close and k_2 open. Now key k_1 is open and k_2 is closed. Now battery is disconnected and galvanometer is directly connected to the same device the deflection in galvanometer is maximum and reversed and decreases to zero gradually. The device is-

A. p-n junction

B. resistance

C. LED

D. capacitor

Answer: D

View Text Solution

View Text Solution

163. A student is given a transister. He is asked to find ot the teminals of p-n-p transistor as emitter, base and collector. He is told that the terminal marked with red dot is emitter. He touches red probe with known terminal as emitter and marks other two lead wires as A and B. He measures resistance between emitter and lead A. Then measured resistance between emitter and lead B and finds that resistance increases. This shows-

A. A is base and B is collector

B. A is collector and B is base

C. eithher can be collector or base

D. multimeter cannot be used to test the terminals

Answer: A

View Text Solution

164. A working transitor with its three legs marked P, Q and R is tested using a multimeter No conduction is found between $P, Q$by connecting the common (negative) terminal of the multimeter to $R$and the other (positive) terminal to or Q some resistance is seen on the multimeter . Which of the following is true for the transistor ?

A. it is an n-p-n transistor with R as base

B. it is a p-n-p transistor with R as collector

C. it is a p-n-p transistor with R as emitter

D. it is an n-p-n transistor with R as collector

Answer: A

Watch Video Solution

Exercise-2

1. Statement 1: Conductivity of semiconductor increases with increase in temperature.

Statement 2: Forbidden energy gap is highest for semiconductors.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: C

Watch Video Solution

2. Statement 1: Conductivity of semiconductors decreases with increase in temperature

Statement-2: More electron goes from valance band to conduction band with increase in temperature.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: D

Watch Video Solution

3. Statement-1: In semiconductors current is obtained due to motion of electrons and holes.

Statement-2: Breaking up of covalent bond produces holes in valence band and electrons in conduction band.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

4. Statement 1: Doping concentration is maximum in emitter in transistor. Statement 2: Maximum number of electrons flows from emitter to base in n-p-n transistor.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: B

Watch Video Solution

5. Statement-1 surface wave and sky wave can not be observed on moon.

Statement-2: Atmosphere of variable refractive index is require for propagation of surface & sky wave.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

6. Statement 1: In ground wave transmission the radio signals die out after travelling some distance.

Statement-2: Radio signals have a very short wavelength and hence are scattered away by the dust particles and molecules of gases in the atmosphere.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

7. Statement 1: Ground wave communication is effective only at low frequencies in the range 500 kHz to about 1500 kHz

Statement 2: The decrease in the intensity of the signal due to absorption by the earth and its atmosphere is higher for higher frequencies.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

8. Statement 1: The refractive index of the ionosphere increases as we go from the lower to upper layers in the ionosphere.

Statement 2: The degree of ionization is higher at the upper layers then at the lower layers of the ionosphere.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: D

Watch Video Solution

9. Statement 1: Sky wave communication is not suitable for frequencies greater than 30 MHz

Statement 2: High frequency signals die out before reaching the ionosphere.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: C

Watch Video Solution

10. Statement 1: Microwaves and not radiowaves are used in satellite communication

Statement 2: The wavelength of microwaves is much shorter then that of radiowaves Hence microwaves do not disperse or diffract like radiowaves.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

11. Statement 1: Long distance radio broadcasts use short wave bands.

Statement 2: Short wavelength signals are reflected by the ionosphere.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

12. Statement 1: Sky wave communication is not used to transmit TV signals

Statement 2: The ionosphere does not reflect TV signals, it transmits them.

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

13. The question has statement - 1 and statement - 2 Of the four choices given after the statements , choose the one that best describes the two statements

statement - 1 : Sky wave signals are used for long distance radio communication . These signals are in generel , less stable then ground wave signals

statement - 2 : The state of inosphere varies from to hour day and season to season .

A. Both statement-1 and statement-2 are true, and statement-2 is the correct explanation of statement 1.

B. Both statement-1 and statement-2 are true but statement-2 is not the correct explanation of statement-2

C. Statement-1 is true but statement-2 is false.

D. Statement-1 is false but statement-2 true.

Answer: A

Watch Video Solution

14. The physical property (ies) which (is) are same along all the directions in an isotropic solid-

A. Refractive index

B. Electrical conductivity

C. Thermal conductivity

D. None of the above.

Answer: A::B::C

Watch Video Solution

15. Choose the wrong statement

A. p-type semiconductor is positively charged

B. n-type semiconductor is negatively charged

C. both p-type and n-type are electrically neutral

D. Both A & C

Answer: A::B::C

Watch Video Solution

16. Which of the following statements is correct-

A. Resistance of semiconductor decreases with increase in temperature

B. In an electric field, displacement of holes is opposite to the displacement of electrons

C. Resistance of a conductor decreases with the increase in temperature

D. n-type semiconductor are neutral.

Answer: A::B::D

Watch Video Solution

17. The materials resistance of which decreases with increases in temperature (i.e. the temperature coefficient of resistance is negative) are called

A. conductors

B. insulators

C. semiconductors

D. all of the above

Answer: B::C

Watch Video Solution

18. Which of the following statements is correct-

A. Resistance of extrinsic semiconductors can be changed as required

B. in n-type semiconductor the umber of electrons increases in valence band

C. In p-type semiconductors the number of holes increases in valence band

D. In pure semiconductor fermi band is situated in between the valence band and conduction band

Answer: A::C::D

Watch Video Solution

19. Pick the correct statement the reverse current in p-n junction diode

A. can be maximum and constant

B. remains constant even after the breakdown voltage

C. becomes infinity at breakdown

D. reverse current is controlled by external resistance.

Answer: A::C::D

View Text Solution

20. In a $p-n$ junction–

A. new holes and conduction electrons are produced continuously throughout the material

B. new holes and conduction electrons are produced continiously throughout the material except in the depletion region

C. holes and conduction electrons recombine continuously throughout the material

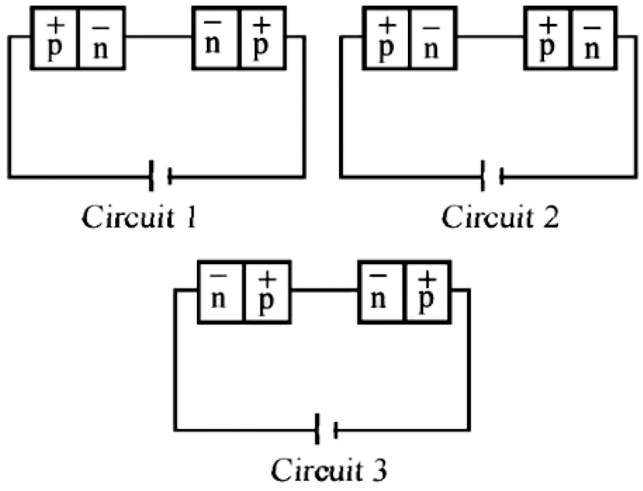
D. holes and conduction electrons recombine continuosly throughout the material except in the depletion region.

Answer: A::D

Watch Video Solution

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

junctions are equal in



A. circuit 1

B. circuit 2

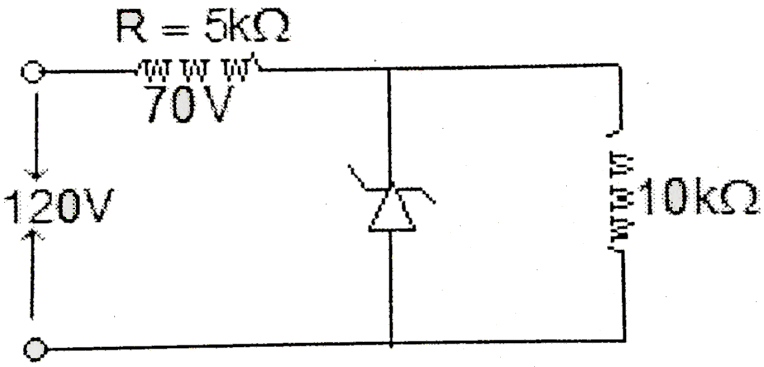
C. circuit 3

D. none

Answer: A::B::C

Watch Video Solution

22.



For the circuit shown in the figure:

A. current through zener diode is 4 mA.

B. current through zener diode is 9 mA

C. the output voltage is 50 V

D. the output voltage is 40 V

Answer: B::C

Watch Video Solution

23. The avalanche break down in p-n junction is not caused due to

A. shift of fermi energy level

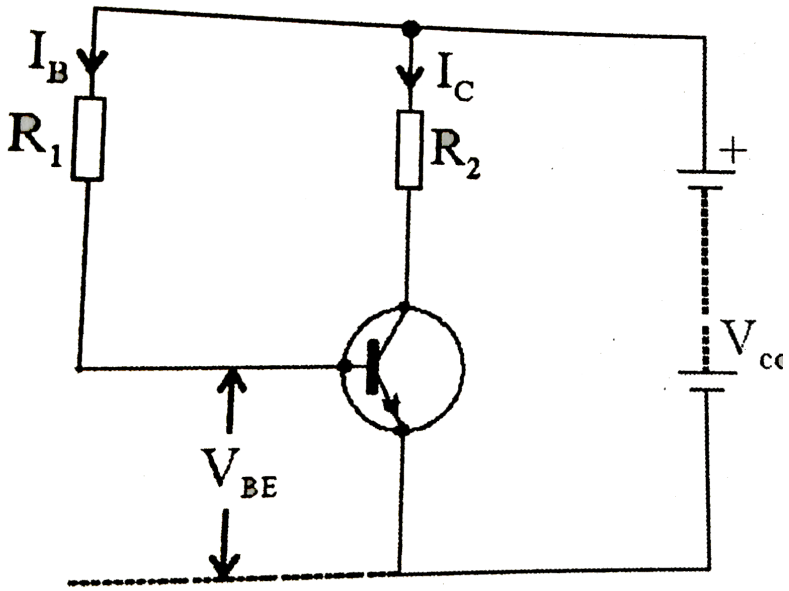
B. widening of forbidden band

C. cumulative effect of conduction band electron collisions

D. High impurity concentration.

Answer: A::B::D

Watch Video Solution



24.

In the junction transistor voltage amplifier circuit of figure, if

$R_1 = 100k\Omega$, $R_2 = 1k\Omega$, $V_{CC} = 6.0V$ and $V_{BE} = 0.6V$ current gain=60

A. $I_B = 54\mu A$

B. $I_C = 3.24mA$

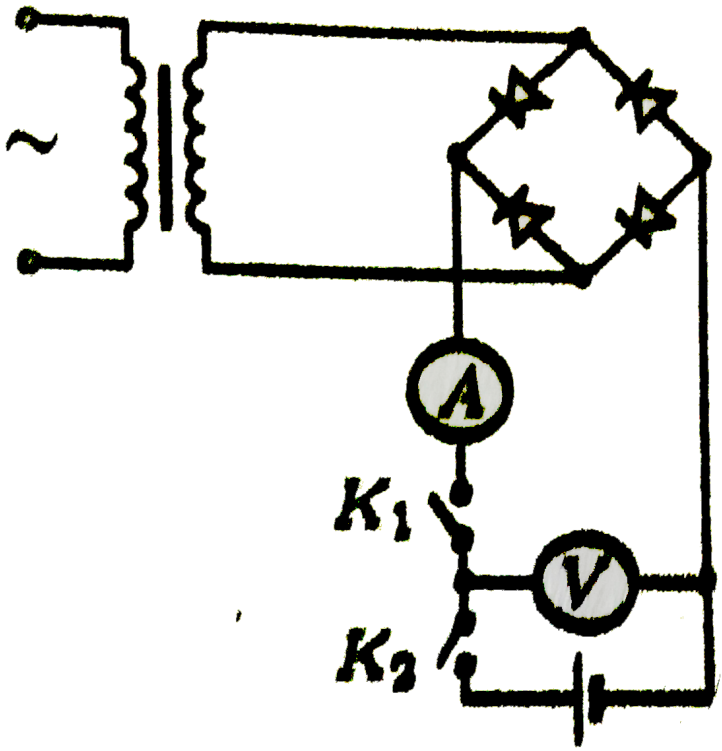
C. the voltage across $R_2 = 3.24V$

D. the voltage across the collector-emitter=3.24V

Answer: A::B::C

View Text Solution

Exercise-3

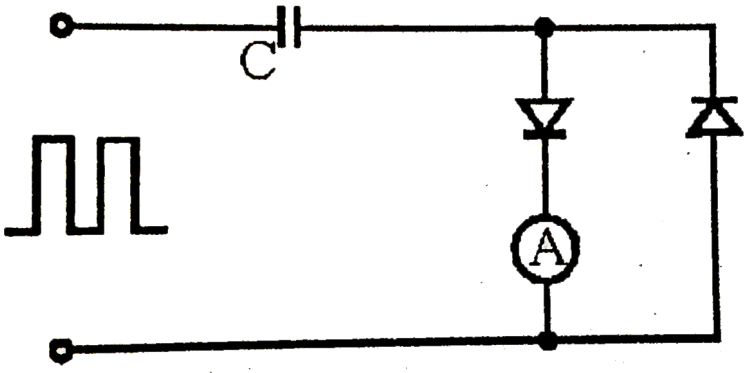


1.

The battery is charged from full wave rectifier fed by a sinuoidal voltage (see figure). Idea diodes, ammeter and voltmeter show the time average value. At idle with only key K_1 closed, coltmeter shows 12 V, and current is then absent, ie, reading of ameter is 0. if only the key K_2 is closed, the voltmeter shows battery voltage at 12.3 V. during charging when the K_1 and K_2 are closed, the voltmeter shows 12.8 V and ammeter shows 5 A. Find the internal resistance of battery.

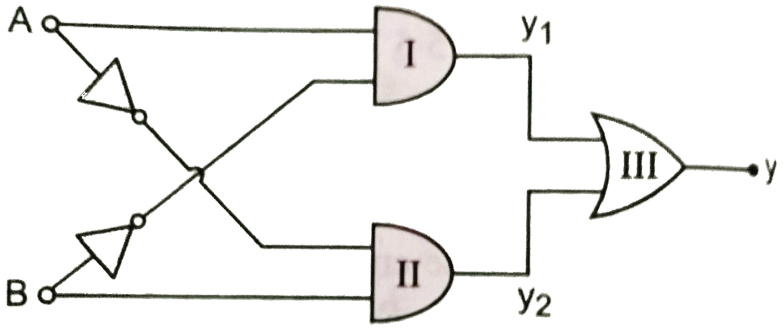
View Text Solution

2. A circuit diagram of a capacitor with two diodes ad an ammeter (Fig) is connected to a source of variable voltage producing rectangular pulses of constant amplitude and frequency. What current does ammeter show? Diodes and ammeter can be considered ideal.

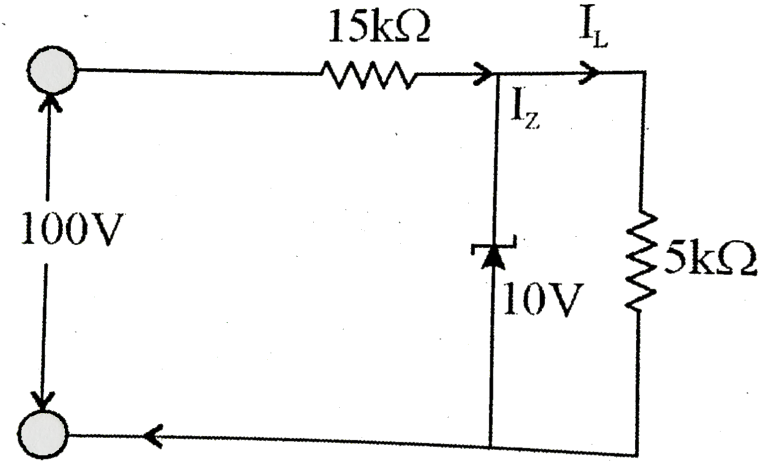


View Text Solution

3. Write the truth table for the circuit shown in Fig.



Watch Video Solution



4.

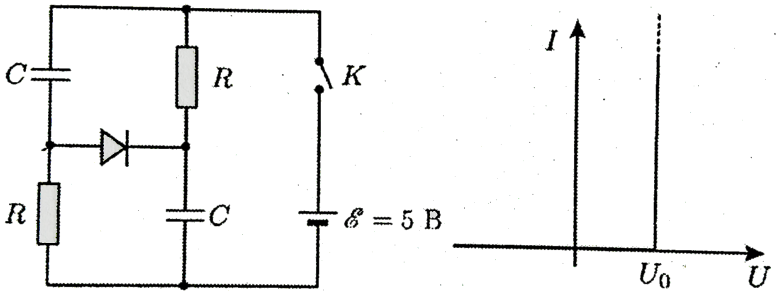
for the circuit shown in figure, find

(i). The output voltage

(ii). The votlage drop across series resistance

(iii). The current through zener diode.

Watch Video Solution



5.

In the initial state of the circuit shown in the figure, the capacitors are not charged. At the time t=0 key is closed. Find the charge accumulated on the capacitor if $R = 10k\Omega$, $C = 10\mu F$, and battery internal resistance $r = 10\Omega$. Volt-ampere characteristic of a diode is show in the chart, with $U_0 = 0.7V$

View Text Solution

6. how many significant figures are give in the following quantities?

(A). 343 g

(B). 2.20

(C). 1.103 N

(D). 0.4142 s

(E). 0.0145 m

(F). 1.0080 V

(G)$9.1 \times 10^4 km$

(H). $1.124 \times 10^{-3} V$

Watch Video Solution

7. Perform the following operations

(A). $703 + 7 + 0.66$

(B). 2.21×0.3

(C). 12.4×84

(D). $14.28 / 0.714$

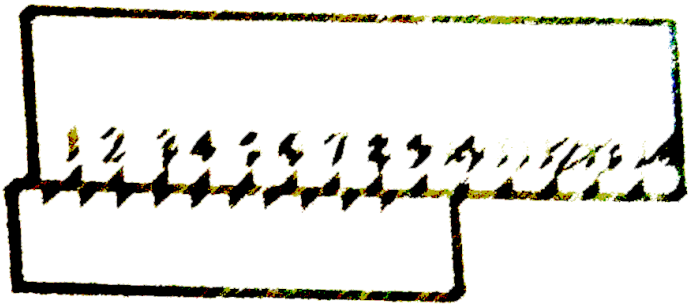
Watch Video Solution

8. Solve with due regard to significant figurers. $\frac{2.91 \times 0.3842}{0.080}$

Watch Video Solution

9. The main scale of a vernier callipers reads $10mm$ in 10 divisions. Ten divisions of vernier scale coincide with nine divisions of the main scale. When the two jaws of the callipers touch each other, the fifth division of the vernier coincides with 9 main scale divisions and zero of the vernier is to the right of zero of main scale, when a cylinder is tighty placed between the two jaws, the zero of the vernier scale lies slighty to the left of $3.2cm$ and the fourth vernier division coincides with a main scale division. Find diameter of the cylinder.

Watch Video Solution

10. 

The VC shown in the diagram has zero error in it (as you can see) it is given that 9msd=10 vsd.

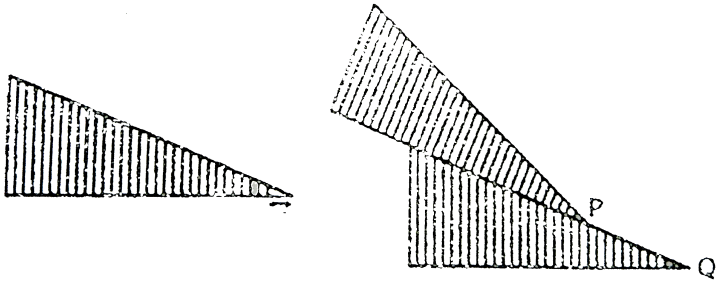
(i). What is the magnitude of the zero error? (1 msd=1 mm)

(ii). The observed reading of the length of a rod measured by this VC comes out to be 5.4 mm. if the vernier had been error free then reading of main scale would be ____and the coinciding division of vernier scale would be___

View Text Solution

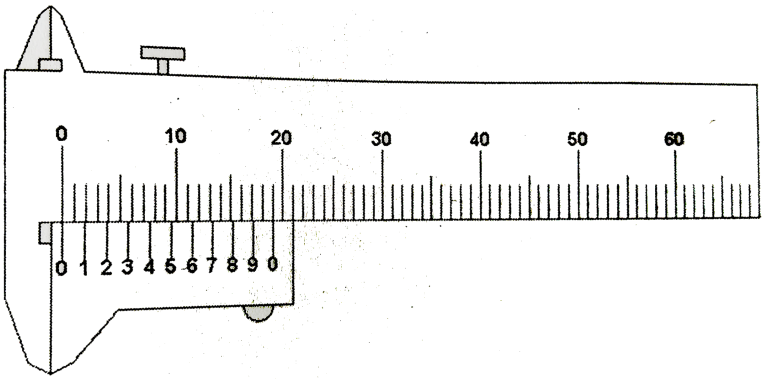
11. Consider a home made vernier scale as shown in the figure. In this diagram, we are interested in measuring the length of the line PQ. If both the inclined are indentical and their angles are equal to θ then what is

the least count of the instrument.



Watch Video Solution

12.



Find the least count of the vernier caliper as shown in figure below. The main scale is in mm (i.e., 10mm, 20mm etc.)

Watch Video Solution

13. The pitch of a screw gauge is $0.5mm$ and there are 50 divisions on the circular scale. In measuring the thickness of a metal plate, there are five divisions on the pitch scale (or main scale) and thirty fourth divisions coincide with the reference line. Calculate the thickness of the metal plate.

Watch Video Solution

14. The pitch of a screw gauge is $1mm$ and there are 50 divisions on its cap. When nothing is put in between the studs, $44th$ divisions of the circular scale coincides with the reference line and the line and the zero of the main scale is not visible or zero of circular scale is lying above the reference line. When a glass plate is placed between the studs, the main scale reads three divisions and the circular scale reads 26 divisions. Calculate the thickness of the plate.

Watch Video Solution

15. In a given optical bench, a needle of length 10 cm is used to estimate bench error. Thhe object needle, image needle & lens holder have their reading as shown.

$X_0 = 1.1$

$X_I = 21.0cm$

$X_L = 10.9cm$

Extimate the bench errors which are present in image needle holder and object needle holder. Also find the focal length of the convex lens when.

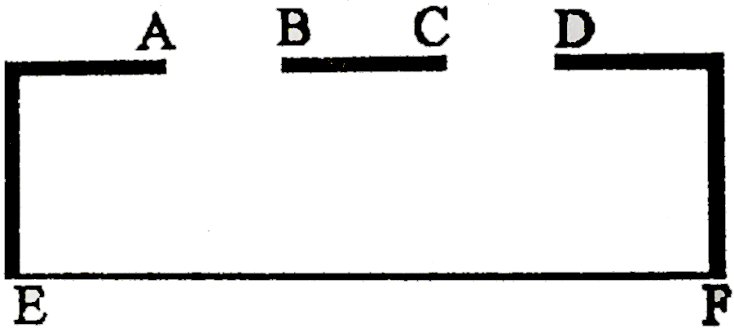
$X_0 = 0.6cm$

$X_I = 22.5cm$

$X_L = 11.4cm$

View Text Solution

16.



Make the appropriate connection in the meter bridge set up shown. Resistance box is connected between___. Unknown resistance is connected between____. Battery is connected between_____.

Watch Video Solution

17. A body travels uniformly a distance of $(13.8 \pm 0.2)m$ in a time $(4.0 \pm 0.3)s$. Find the velocity of the body within error limits and the percentage error.

Watch Video Solution

18. Consider $S = X\cos(\theta)$ for $X = (2.0 \pm 0.2)cm, \theta = 53 \pm 2^{\circ}$. Find S.

Watch Video Solution

19. Two resistance R_1 and R_2 are connected in (i) series and (ii) parallel. What is the equivalent resistance with limit of possible percentage error in each case of $R_1 = 5.0 \pm 0.2\Omega$ and $R_2 = 10.0 \pm 0.1\Omega$

Watch Video Solution

20. A substance weight 5.74 g occupies a volume of $1.2cm^3$. Caluclate its density with due regard to significant digits.

Watch Video Solution

21. The time period of oscillation of a simple pendulum is given by $T = 2\pi\sqrt{l/g}$

The length of the pendulum is measured as $1 = 10 \pm 0.1$ cm and the time period as $T = 0.5 \pm 0.02s$. Determine percentage error in te value of g.

Watch Video Solution

22. A physical quantity P is related to four observables A, B, C and D as $P = 4\pi^2 A^3 B^2 / \left(\sqrt{C} D\right)$ the percentage error of the measurement in A, B, C and D are 1%,3% and 2%, 4% respectively. Determine the percenrage error & absolute error in the quantity P. Value of P is calculated 3.763.

Watch Video Solution

23. A glass prism of angle $A = 60^\circ$ gives minimum angle of deviation $\theta \approx 30^\circ$ with the maximum error of 1° when a beam of parallel light passed through the prism during an experiment. Find the permissible error in the measurement of refractive index μ of the material of the prism.

Watch Video Solution

24. In a vemier callipers the main scale and the vernier scale are made up different materials. When the room temperature increases by $\Delta T^{\circ} C$, it is found the reading of the instrument remains the same. Earlier it was observed that the front edge of the wooden rod placed for measurment crossed the N^{th} main scale division and (N + 2) msd coincided with the 2nd vsd. Initially, 10 vsd coincided with 9 msd. If coefficient of linear expansion of the main scale is α_1 and that of the vermier scale is α_2 then what is the value of α_1 / α_2 ? (Ignore the expansion of the rod on heating)

A. $1.8/(N)$

B. $1.8/(N+2)$

C. $1.8/(N-2)$

D. none

Answer: B

Watch Video Solution

Exercise-4

1. Two identical p-n juctions may be connected in series with a battery in three ways.the potential difference across the two p-n junction are equal in

- Circuit 1 and circuit 2
- circuit 2 and circuit 3
- circuit 3 and circuit 1
- circuit 1 only

Answer: B

Watch Video Solution

2. In a silicon transistor the base current is chage by $20\mu A$ and this changes the emitter base voltage by 0.02V and the collector current changes by 2 mA. If the transistor is used as an amplifier with load resistance $5k\Omega$, what is the voltage gain?

A. 100

B. 200

C. 250

D. 500

Answer: D

Watch Video Solution

3. An electric field us applied to a semiconductor.Let the number of charge carriers be n and the average drift speed be v.If the temperature is increased,

A. Both n and v will increase

B. n will increase but v will decrease

C. v will increase but n will decrease

D. Both n and v will decrease

Answer: B

Watch Video Solution

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

A. Conduct

B. Not conduct

C. Conduct partially

D. Breakdown

Answer: A

Watch Video Solution

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

A. Phosphorous

B. Antimony

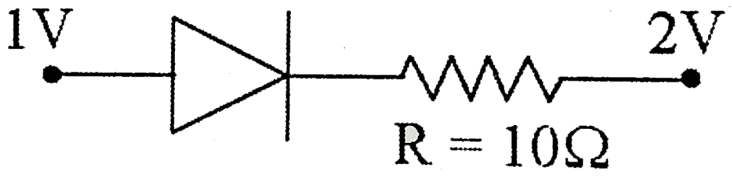
C. Boron

D. Aluminium

Answer: C::D

Watch Video Solution

6.



Assuming that the junction diode is ideal, the current in arrangement shown in figure is

A. 20 mA

B. zero

C. 30 mA

D. 10 mA

Answer: B

Watch Video Solution

7. Find the gain of an amplifier using a transistor (BF 115) in common emitter circuit when $\beta = 50$ and input and output resistances of the transistor being $0.6k\Omega$ and $60K\Omega$

A. 4050

B. 5000

C. 2370

D. 6000

Answer: B

Watch Video Solution

8. The energy gap separating valence band from a conduction band is 0.7 eV for a material Hence it is a

A. metal

B. Germanium semiconductor

C. Silicon semiconductor

D. Non-metal

Answer: B

Watch Video Solution

9. A transistor is connected in commono emitter configuration. The collector emitter voltage is 8 V and load resistance of 8000Ω is connected in the collector circuit the voltage drop across the load resistance is 0.5V. If the current gain be 0.96, what is the base current

A. $5\mu A$

B. $8\mu A$

C. $9.6\mu A$

D. $26\mu A$

Answer: D

Watch Video Solution

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

A. 0.2 V

B. 0.6 V and 0.9 V

C. 1.1 V

D. 1.4 V

Answer: B

Watch Video Solution

11. A transistor have a β a equal to 80 has a change in base current of 250μ ampere, then the change in collector current is

A. $80X \quad 250\mu A$

B. $(250-80)\mu A$

C. $(250+80)\mu A$

D. $(250/80\mu A)$

Answer: A

Watch Video Solution

12. The edge of a cube is $a = 1.2 \times 10^{-2}m$. Then its volume will be recorded as:

A. $1.7 \times 10^{-6}m^3$

B. $1.70 \times 10^{-6}m^3$

C. $1.70 \times 10^{-7}m^3$

D. $1.78 \times 10^{-6} m^3$

Answer: A

Watch Video Solution

13. In a vernier callipers, n divisions of its main scale match with (n+1) divisions on its vernier scale. Each division of the main scale is a units. Using the vernier principle, calculate its least count.

Watch Video Solution

14. A wire has a mass $0.3 \pm 0.003g$, radius $0.5 \pm 0.005mm$ and length $6 \pm 0.06cm$. The maximum percentage error in the measurement of its density is

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

15. In Searle's experiment, the diameter of the wire as measured by a screw gauge of least count $0.01cm$ is $0.050cm$. The length, measured by a scale of least count $0.1cm$, is $110.0cm$. When a weight of $50N$ is suspended from the wire, the extension is measure to be $0.125cm$ by a micrometer of least count $0.01cm$. Find the maximum error in the measurement of Young's modulus of the material of the wire from these data..

Watch Video Solution

16. The pitch of a screw gauge is 1 mm and there are 100 division on the circular scale. While measuring the diameter of a wire, the linear scale reads 1mm and 47th division on circular scale coincides with the reference line. The length of the wire is 5.6 cm. Find the curved surface area $\left(\in cm^2 \right)$ of the wire in proper significant figures.

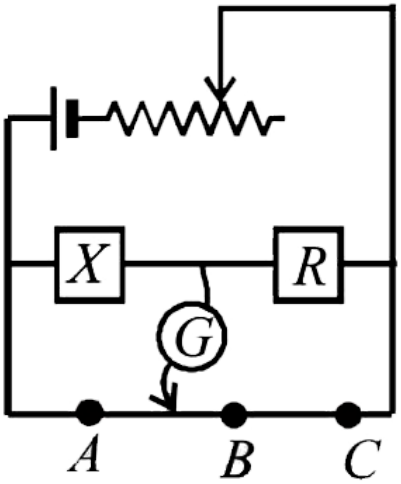
Watch Video Solution

17. Draw the circuit for experimental verification of Ohm's law using a source of variable DC voltage, a main resistance of 100Ω, two galvanometers and two resistances of value $10^6\Omega$ and $10^{-3}\Omega$ respectively. Clearly show the positions of the voltmeter and the ammeter.

Watch Video Solution

18. An unknown resistance X is to be determined using resistances R_1, R_2 or R_3. Their corresponding null points are A, B and C. Find which

of the above will give the most accurate reading and why?



$R = R_1$ or R_2 or R_3.

Watch Video Solution

19. In a resonance column method, resonance occurs at two successive level of $l_1 = 30.7cm$ and $l_2 = 63.2cm$ using a tuning fork of $f = 512Hz$. What is the maximum error in measuring speed of sound using relations $v = f\lambda \& \lambda = 2(l_2 - l_1)$

A. 256 cm/sec

B. 92 cm/sec

C. 128 cm/sec

D. 102.4 cm/sec

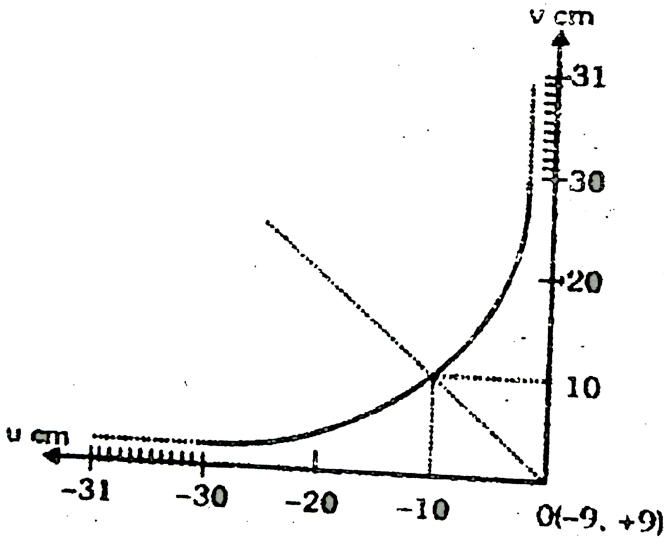
Answer: D

Watch Video Solution

20. The side of a cube is measured by vernier callipers (10 divisions of a vernier scale coincide with 9 divisions of main scale, where 1 division of main scale is $1mm$). The main scale reads $10mm$ and first division of vernier scale coincides with the main scale. Mass of the cube is $2.736g$. find the density of the cube in appropriate significant figures.

Watch Video Solution

21. Graph of position of image vs position of point object from a convex lens is shown. Then, focal length of the lens is



A. $0.50 \pm 0.05cm$

B. $0.50 \pm 0.10cm$

C. $5.00 \pm 0.05cm$

D. $5.00 \pm 0.10cm$

Answer: C

Watch Video Solution

22. In a screw gauge, the zero of mainscale coincides with fifth division of circular scale in figure (i). The circular division of screw gauge are 50. It moves $0.5mm$ on main scale In one rotation. The diameter of the ball in figure (ii) is

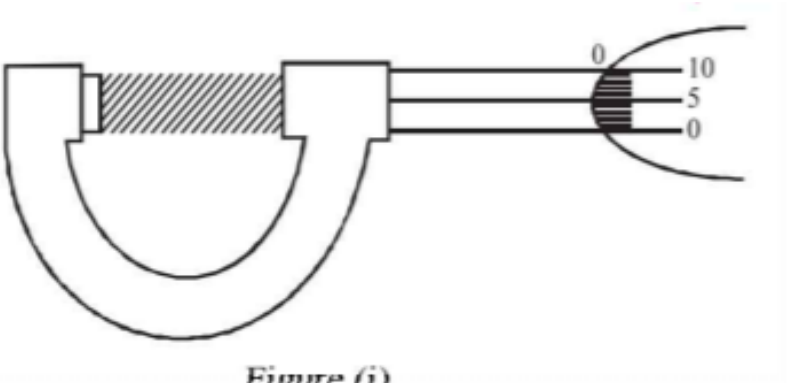


Figure (i)

A. 2.25 mm

B. 2.20 mm

C. 1.20 mm

D. 1.25 mm

Answer: C

Watch Video Solution

23. A student performs an experiment for determination of $g\left[=\frac{4\pi^2 L}{T^2}\right]$, $L \approx 1m$, and he commits an error of ΔL. For T he takes the time of n oscillations with the stop watch of least count ΔT . For which of the following data , the measurement of g will be most accurate ?

A.

Δl	ΔT	n	Amplitude of oscillation
$5mm$	$0.2\,\text{sec}$	10	$5mm$

B.

Δl	ΔT	n	Amplitude of oscillation
$5mm$	$0.2\,\text{sec}$	20	$5mm$

C.

Δl	ΔT	n	Amplitude of oscillation
$5mm$	$0.1\,\text{sec}$	20	$1mm$

D.

Δl	ΔT	n	Amplitude of oscillation
$1mm$	$0.1\,\text{sec}$	50	$1mm$

Answer: D

Watch Video Solution

24. In an experiment to determine the focal length (f) of a concave mirror by the $u-v$ method, a student places the object pin A on the principal axis at a distance x from the pole P. The student looks at the pin

and its inverted image from a distance keeping his/her eye in line with PA. When the student shifts his/her eye towards left, the image appears to the right of the object pin. Then,

A. $x < f$

B. $f < x < 2f$

C. $x = 2f$

D. $x \geq 2f$

Answer: B

Watch Video Solution

Column I	Column II
(A) GM_eM_s G — universal gravitational constant, M_e — mass of the earth, M_s — mass of the Sun	(P) (volt) (coulomb) (metre)
(B) $\frac{3RT}{M}$ R — universal gas constant, T — absolute temperature, M — molar mass	(Q) (kilogram) $(\text{metre})^3$ $(\text{second})^{-}$
(C) $\frac{F^2}{q^2B^2}$ F — force, q — charge, B — magnetic field	(R) $(\text{metre})^2$ $(\text{second})^{-2}$
(D) $\frac{GM_e}{R_e}$ G — universal gravitational constant, M_e — mass of the earth, R_e — radius of the earth	(S) (farad) $(\text{volt})^2$ $(\text{kilogram})^{-1}$

25.

Some physical quantities are given in Column I and some possible SI units in which these quantities may be expressed are given in Column II. Match the physical quantities in Column I with the units in Column II and indicate your answer by darkening appropriate bubbles in the 4×4 matric given in the ORS.

View Text Solution

26. A student performs an experiment to determine the Young's modulus of a wire, exactly$2m$ long, by Searle's method. In a partcular reading, the student measures the extension in the length of the wire to be

$0.8mmwithanuncerta\int yof$+- 0.05mm$ataloadofexactly$1.0kg , $thestudentalsomeasuresthediameterofthewire \rightarrow be$04mm $withanuncerta\int yof$+-0.01mm. $Take$g=9.8m//s^(2)` (exact). the Young's modulus obtained from the reading is

A. $(2.0 \pm 0.3) \times 10^{11} N/m^2$

B. $(2.0 \pm 0.2) \times 10^{11} N/m^2$

C. $(2.0 \pm 0.1) \times 10^{11} N/m^2$

D. $(2.0 \times \pm 0.05) \times 10^{11} N/m^2$

Answer: A::B

Watch Video Solution

27. Student $I, II,$ and III perform an experiment for measuring the acceleration due to gravity (g) usinf a simple pendulum. They use lengths of the pendulum and // or record time for different number of oscillations . The observations are shown in the following table . Least count for length $= 0.1cm$

Student	Length of Pendulam (cm)	Number of n Oscillation (n)	Time Period (s)
I	64.0	8	16.0
II	64.0	4	16.0
III	20.0	4	9.0

Least count for time $= 0.1s$.

If E_I, E_{II} , and E_{III} are the percentage errors in g , i.,e., $\left(\frac{\Delta g}{g} \times 100\right)$ for students I,II , and III, respectively , then

A. $E_I = 0$

B. E_I is minimum

C. $E_I = E_{II}$

D. E_{II} is maximum

Answer: B

Watch Video Solution

28. A student uses a simple pendulum of exactly $1m$ length to determine g, the acceleration due ti gravity. He uses a stop watch with the least

count of $1\,\sec$ for this and record $40\,\sec onds$ for 20 oscillations for this observation, which of the following statement $(s)is(are)$ true?

A. Error ΔT in measuring T, the time period, is 0.05 seconds

B. Error ΔT in measuring T, the time period, is 1 second

C. Percentage error in the determination of g is 5%

D. Percentage error in the determination of g is 2.5%

Answer: A::C

Watch Video Solution

29. A vernier calipers has $1mm$marks on the main scale. It has 20 equal divisions on the Verier scale which match with 16 main scale divisions. For this Vernier calipers, the least count is

A. 0.02 mm

B. 0.05 mm

C. 0.1 mm

D. 0.2 mm

Answer: D

Watch Video Solution

30. The density of solid ball is to be determined in an experiment the diameter of the ball is measured with a screw gauge, whose pitch is 0.5 mm and there are 50 divisions on the circular scale. The reading on the relative error of 2%, the relative percentage error error in the density is

A. 0.009

B. 0.024

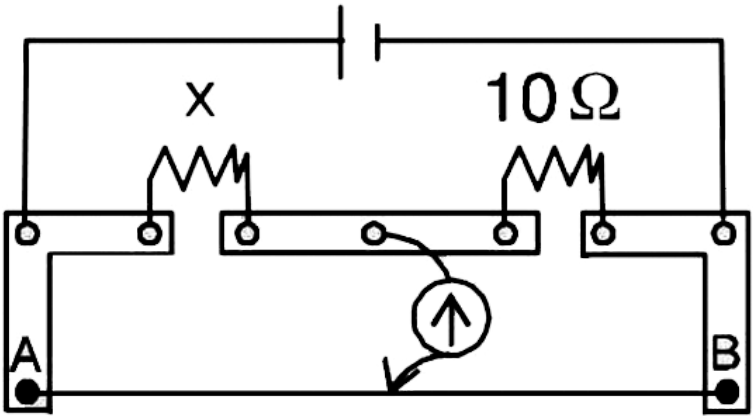
C. 0.031

D. 0.042

Answer: C

View Text Solution

31. A meter bridge is set up as shown, to determine an unknown resistance X using a standard 10 ohm resistor. The galvanometer shows null point when tapping -key is at 52 cm mark. The end-corrections are 1 cm and 2 cm respectively for the ends A and B. The determine value of X is



A. 10.2 ohm

B. 10.6 ohm

C. 10.8 ohm

D. 11.1 ohm

Answer: B

Watch Video Solution

32. In the determination of Young's modulus $\left(Y = \frac{4MLg}{\pi / d^2}\right)$ by using Searle's method, a wire of length L= 2 m and diameter d = 0.5 mm is used. For a load M = 2.5 kg, an extension l = 0.25 mm in the length of the wire is observed. Quantities d and l are measured using a screw gauge and a micrometer, respectively. The have the same pitch of 0.5 mm. The number of divisions on their circular scale is 100. The contributions to the maximum probable error of the Y measurement

A. due to the error in the mearurement of d and l are the same.

B. Due to the error in the measurement of d is twice that due to the error in the measurement of l.

C. due to the error in the measurement of l is twice that due to the error in the measurement of l.

D. due to the error in the measurement of d is four times that due to the error in the measurement of l.

Answer: A

Watch Video Solution

33. The diameter of a cylinder is measured using a vernier callipers with no zero error . It is found that the zero of the vernier scale lies between $5.10 \text{ and } 5.15cm$ of the main scale . The $24th$ division of the vernier scale exactly coincides with one of the main scale divisions . The diameter of the cylinder is

A. 5.112 cm

B. 5.124 cm

C. 5.136 cm

D. 5.148 cm

Answer: B

Watch Video Solution

34. Using the expression $2d\sin\theta = \lambda$, one calculates the values of d by measuring the corresponding angles θ in the range $0 \to 90\circ$. The wavelength λ is exactly known and error in θ is constant for all values of θ. As θ increases from $0\circ$

A. the absolute error in d remains constant

B. the absolute error in d increase

C. the fractional error in d remains constant

D. the fractional error in decreases.

Answer: D

Watch Video Solution

35. During Searle's experiment, zero of the Vernier sacle lies between 3.20×10^{-2}, and $3.25 \times 10^{-2}m$ of the main scale. The 20^{th} division of the Vernier scale exactly coincides with one of the main scale divisions. When an additional load of $2kg$ is applied to the wire, the zero of the

vernier scale still lies between 3.20×10^{-2}, and $3.25 \times 10^{-2} m$ of the main scale but now the 45^{th} division of Vernier scale coincide with one of the main scale divisions. the length of the thin metallic wire is $2m$ and its cross-sectional ares is $8 \times 10^{-7} m^2$. the least count of the Vernier scale is $1.0 \times 10^{-5} m$. the maximum percentage error in the Young's modulus of the wire is

Watch Video Solution

36. Consider a Vernier callipers in which each $1cm$ on the main scale is divided into 8 equal divisions and a screw gauge with 100 divisions in its circular scale. In the Vernier callipers, 5 divisions of the Vernier scale coincide with 4 divisions on the scale and in the screw gauge, one complete rotation of the circular scale moves it by two divisions on the linear scale. Then :

A. If the pitch of the screw gauge is twice the least count of the vernier callipers, the least count of te screw gauge is 0.01mm.

B. if the pitch of the screw gauge is twice the least count of the vernier callipers, the least count of the screw gauge is 0.005 mm.

C. if the least count of the linear scale of the screw gauge is twice the least count of the vernier callipers, the least count of the screw gauge is 0.01 mm.

D. If the least count of the linear scale of the screw gauge is twice the least count of the vernier callipers, the least count of te scerw gauge is 0.005 mm.

Answer: B::C

Watch Video Solution

37. The energy of a system as a function of time t is given as $E(t) = A^2 \exp(-\alpha t), \alpha = 0.2s^{-1}$. The measurement of A has an error of $1.25\,\%$. If the error In the measurement of time is $1.50\,\%$, the percentage error in the value of $E(t)$ at t = 5 s` is

Watch Video Solution

Exercise-4 Section-B

1. Electrimagnetic waves are transverse is nature is evident by

A. polarization

B. interference reflection

C. reflection

D. diffraction

Answer: A

Watch Video Solution

2. An electromagnetic wave of frequency $v = 3.0MHz$ passes from vacuum into a dielectric medium with permittivity $\varepsilon = 4.0$. Then

A. wavelength is doubled and frequency unchanged.

B. wavelength is doubled and frequency becomes half.

C. Wavelength is halved and frequency remains unchanged.

D. wavelength and frequency both remains unchanged.

Answer: C

Watch Video Solution

3. Displacement current is

A. When electric field is changing in the circuit

B. when magnetic field is changing in the circuit

C. in both type of fields

D. through wires and resistance only

Answer: A

Watch Video Solution

4. If the source of power $4kW$ product 10^{20} photons //second , the radiation belongs to a part spectrum called

A. microwaves

B. γ-rays

C. X-rays

D. ultraviolet rays

Answer: C

Watch Video Solution

5. A radar has a power of $1kW$ and is operating at a frequency of $10GHz$. It is located on a mountain top of height $500m$. The maximum distance upto which it can detect object located on the surface of the earth (Radius of earth $6.4 \times 10^6 m$) is

A. 40 km

B. 64 km

C. 80 km

D. 16 km

Answer: C

Watch Video Solution

6. An electromagnetic wave in vacuum has the electric and magnetic field $\vec{E}$ and $\vec{B}$, which are always perpendicular to each other. The direction of polarization is given by $\vec{X}$ and that of wave propagation by $\vec{K}$. Then

A. $\vec{X} \| \vec{B}$ and $\vec{k} \| \vec{E} \times \vec{B}$

B. $\vec{X} \| \vec{E}$ and $\vec{k} \| \vec{B} \times \vec{E}$

C. $\vec{X} \| \vec{B}$ and $\vec{k} \| \vec{B} \times \vec{E}$

D. $\vec{X} \| \vec{E}$ and $\vec{k} \| \vec{E} \times \vec{B}$

Answer: D

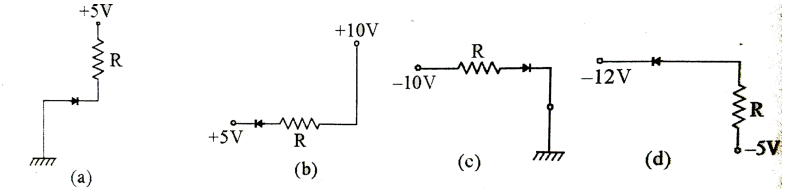
Watch Video Solution

CBSE Question

1. How does the width of the depletion layer of a p-n junction diode change with decrease in reverse bias?

Watch Video Solution

2.



In the following diagrams, write which of the nodes are forward biased and which are reverse biased.

Watch Video Solution

3. The output of a 2-inputs NAND gate is fed to a NOT gate. Write down the truth table for the output of the combination for all possible input of the combination for all possible inputs of A and B.

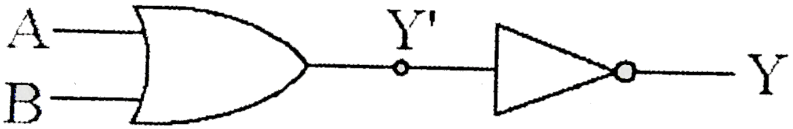
Watch Video Solution

4. ZENER DIODE AS VOLTAGE REGULATOR

Watch Video Solution

5. Draw a labelled circuit diagram for a common emitter amplifier using n-p-n transistor. Write down the expression for its voltage gain. What is the phase difference between input and output signals?

Watch Video Solution

6. 

Name of gate obtained from the combination of gates shown in the figure. Draw its logic symbol. Write the truth table of the combination.

Watch Video Solution

7. How is p-type semiconductor formed? Name the major charge carriers in it. Draw the energy band diagram of a p-type semiconductor.

Watch Video Solution

8. ZENER DIODE AS VOLTAGE REGULATOR

Watch Video Solution

9. Draw a labelled circuit diagram of a common base amplifier using a p-n-p transistor. Define the term voltage gain and write an expression for it.

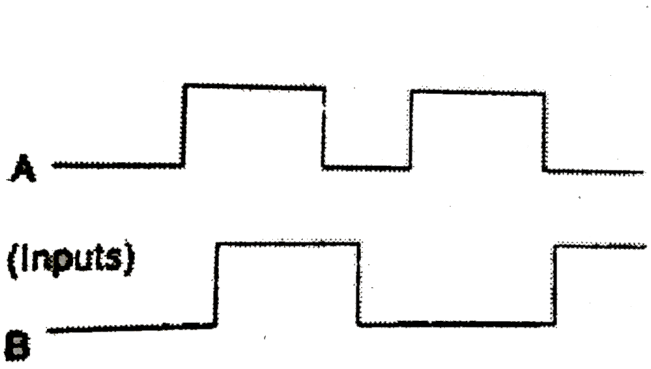
Watch Video Solution

10. Draw the voltage current characteristic fo a zener diode.

Watch Video Solution

11. With the help of a labelled circuit diagram, explain how an n-p-n transistor can be used as an amplifier in common-emitter configuration. Explain how the input and output voltages are out of phase by 1800 for a common-emitter transistor amplifier.

Watch Video Solution



12.

Give the logic symbol for an OR gate. Draw the output wave form for input wave forms A and B for this gate.

Watch Video Solution

13. How does the resistivity of (i) a conductor and (ii) a semiconductor vary with temperature? Give reason for each case.

Watch Video Solution

14. Distinguish between conductor (or metals), semiconductors and insulators on the basis of their energy bands.

Watch Video Solution

15. (a). Explains briefly with the help of a circuit diagram how V-I characteristics of a p-n junction diode are obtainedin (i) forward bias, and (ii) reverse bias.

(b). A photo diode is fabricated from a semiconductor with a band gap of 2.8 EV. Can it detect wave length of 6000. nm? Justify.

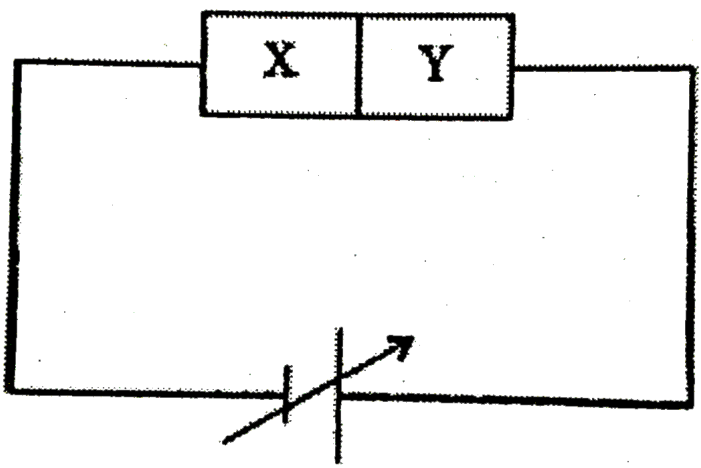
Watch Video Solution

16. Explain (i) forward biasing (ii) reverse biasing of a P-N junction diode. With the help of a circuit diagram, explain the use of this device as a half wave rectifier.

Watch Video Solution

17. Distinguish between conductor (or metals), semiconductors and insulators on the basis of their energy bands.

Watch Video Solution



18.

Two semiconductor materials X and Y shown in the given figure, are made by doping germanium crystal with indum and arsenic respectively. The two are joined end to end and connected to a battery as shown.

(i). Will the junction be forward biased or reverse biased.?

(ii). Sketch a V-I graph for this arrangement.

Watch Video Solution

19. Draw the circuit diagram of a common emitter amplifier using n-p-n transistor. What is the phase difference between the input signal and output voltage? State two reasons why a common emitter amplifier is preferred to a common base amplifier.

Watch Video Solution

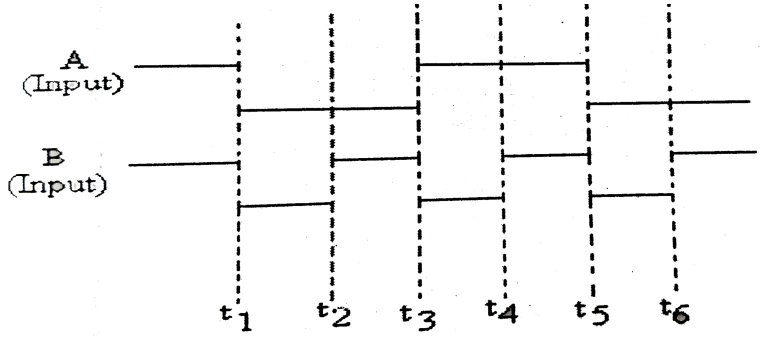
20. Expalin the formation of energy band in solids. Draw energy band diagram for (i) and conductor (ii) and intrinsic semiconductor.

Watch Video Solution

21. Distinguish between intrinsic semiconductor and p-type semiconductor. Give reason, why a p-type semiconductor crystal is electrically neutral, although $n_h > > n_e$?

Watch Video Solution

22.



The give inputs A, B are fed to a 2-input NAND gate. Draw the output wave form of the gate.

Watch Video Solution

23. The output of a 2-input AND gate is fed to a NOT gate. Give the name of the combination and its logic symbol. Write down its truth table.

Watch Video Solution

24. Draw a circuit diagram of a transistor amplifier in CE configuration. Define the terms (i) Input resistance and (ii) Current amplification factor. How are these determined using input and output characteristics?

Watch Video Solution

Watch Video Solution

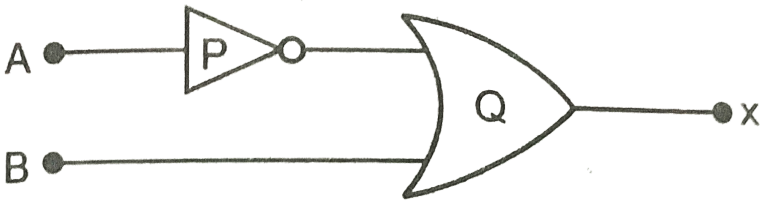
25. Explain (i) forward biasing (ii) reverse biasing of a P-N junction diode. With the help of a circuit diagram, explain the use of this device as a half wave rectifier.

Watch Video Solution

26. In V-I characteristics of a p-n junction diode, why is the current under reverse bias almost independent of the applied potential upto a critical voltage?

Watch Video Solution

27. (i) Identify the logic gates marked P and Q in the given logic circuit Fig.



(ii) Write down the output at X for the inputs $A = 0, B = 0$ and $A = 1, B = 1$.

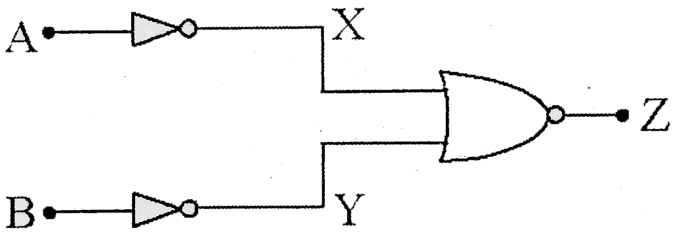
Watch Video Solution

28. What happens to the width of depletion layer of a p-n junction when it is (i) forward biased, (ii) reverse biased?

Watch Video Solution

29. Draw a circuit diagram of a full-wave rectifier. Explain its working principle. Draw the input/output wave forms indicating clearly the function of the two diode used.

Watch Video Solution



30.

You are given a circuit below. Write its truth table. Hence, identify the logic operation carried out by this circuit. Draw the logic symbol of the gate it corresponds to.

Watch Video Solution

31. Explain the formation of depletion layer and potential barrier in p-n junction.

Draw the circuit diagram of a half wave rectifier and explain its working.

Watch Video Solution

32. Draw a circuit diagram of a full-wave rectifier. Explain its working principle. Draw the input/output wave forms indicating clearly the

function of the two diode used.

Watch Video Solution