PHYSICS

BOOKS - PRADEEP PHYSICS (HINGLISH)

ELECTRONIC DEVICES

Solved Examples

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

Watch Video Solution

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

Watch Video Solution

3. The densities of electrons and holes in an extrinsic semiconductor are $7.5 \times 10^{13} cm^{-3}$ and $4.5 \times 10^{12} cm^{-3}$ respectively. The mibilities of electrons and holes are $23 \times 10^{3} cm^{2} / V - s$ and $10^{2} cm^{2} / V - s$ respectively. What is the type of semiconductor? Find the resistivity of this semiconductor.

Watch Video Solution

4. In a p-n junction diode the reverse saturation current is $10^{-5}A$ at $27^{\circ}C$. Find the forward current for a voltage of $0.2V$. Given exp. $(7.62) = 2038.6, k = 1.4 \times 10^{-23}JK^{-1}$.

Watch Video Solution

5. In a n-p-n transister circuit the collector current is $9mA$. If 90% of the electrons emitted reach the collector, find emitter current and base current

Watch Video Solution

6. In a transistor when base-emitter voltage is changed from $0.6V$ to $0.8V$, the change in base current is $500\mu A$ to the change in collector current is $10mA$ to $40mA$, when the collector-emitter voltage is kept constant at $2V$. Find input impendance forward current ratio:

Watch Video Solution

7. In a common base circuit, the current gain is 0.96. If the base current is $60\mu A$, find the emitter current and collector current.

Watch Video Solution

8. For a common base amplifier, if the values of resistance gain and voltage gain are 3000 and 2800 respectively, find the current gain and power gain of this amplifier.

Watch Video Solution

9. The current gain for common emitter amplifier is 59. if the emitter current is 6.0mA, find the base of current and collector current

Watch Video Solution

10. Convert binary number 10111 into decimal number.

Watch Video Solution

11. Convert binary number 1010 into decimal number.

Watch Video Solution

12. Determine the binary equivalent of $(0.25)_{10}$.

Watch Video Solution

13. Determine the binary equivalent of $(6.25)_{10}$.

Watch Video Solution

14. Find the fractional decimal number of $(0.101)_2$.

Watch Video Solution

15. Let us add $(110010)_2$ and $(111101)_2$.

Watch Video Solution

16. Let us add $(10101)_2$ and $(1011)_2$

Watch Video Solution

17. Let us find the difference of $(111101)_2$ and $(110010)_2$

Watch Video Solution

18. Find the maximum wave- length of electromagnatic radiation which can creat a hole-electron pair in silicon. The band is silicon is $1.1eV$. [Use $h = 6.6 \times 10^{-34} Js, c = 3 \times 10^{8} ms^{-1}, e = 1.6 \times 10^{-19} C$]

Watch Video Solution

19. The mean free path of conduction electrons in copper is about $4 \times 10^{-8} m$. Find the electric field which can give, on an avrage, $2eV$ energy to a conduction electron in a block of copper.

Watch Video Solution

20. In a pure semiconductor, the number of conduction electron is 6×10^{19} per cubic metre of size $1cm \times 1cm \times 2mm$?

Watch Video Solution

21. A semiconductor has equal electron and hole concentration of $2 \times 10^{8} m^{-3}$. On doping with a certain impurity, the hole concertraction increases to $4 \times 10^{10} m^{-3}$. (i) What type of semiconductor is obtained on doping? (ii) Calculate the new electron hole concentration of the semiconductor. (iii) How does the energy gap very with doping?

Watch Video Solution

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

Watch Video Solution

23. Suppose the energy liberated in the recombination of a hole-electron pair is converted into electromagnetic radiation. If the maximum wavelength emitted is 660nm, what is the band width? (Use $h = 6.6 \times 10^{-34} J - s$)

Watch Video Solution

24. Find the maximum wavelength of electromagnatic radiation which can creat a hole-electron pair in silicon. The band is silicon is $1.1eV$. [Use $h = 6.6 \times 10^{-34} Js, c = 3 \times 10^8 ms^{-1}, e = 1.6 \times 10^{-19} C$.

Watch Video Solution

25. A semiconductor is made extrinsic by adding trivalent impurity. The resulting p-type semiconductor should be of conductivity $12 mhom^{-1}$. Mobility of holes is $400 cm^2 V^{-1} s^{-1}$. Neglecting electron contribution find the number density of accetor atoms. charge on an electron $= 1.6 \times 10^{-19} C$.

Watch Video Solution

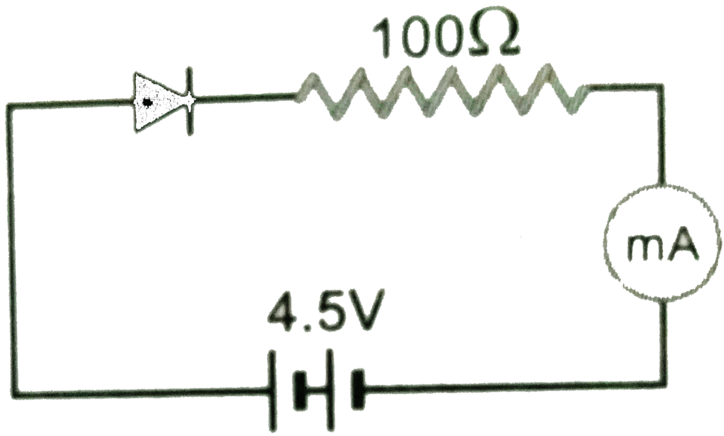
26. A semiconductor is known to have an electron concentration of $5 \times 10^{12} cm^{-3}$ and a hole concentration $8 \times 10^{13} cm^{-3}$ Is the semi-conductor n-type or p-type? What is the resistivity of the sample, if the electron mobility is $23,000 cm^2 V^{-1} s^{-1}$? Take charge on electron, $e = 1.6 \times 10^{-19} C$.

Watch Video Solution

27. A p-n junction when forward biased has a drop of $0.6V$ which is assumed to be independent of current. The current in excess of $10mA$through the diode produces a large joule heating effect which burns the diode. If we want to use $1.5V$ battery to forward bias the diode, what should be the value of resistor used in series with the diode so that the maximum current does not exceed 6 mA?

Watch Video Solution

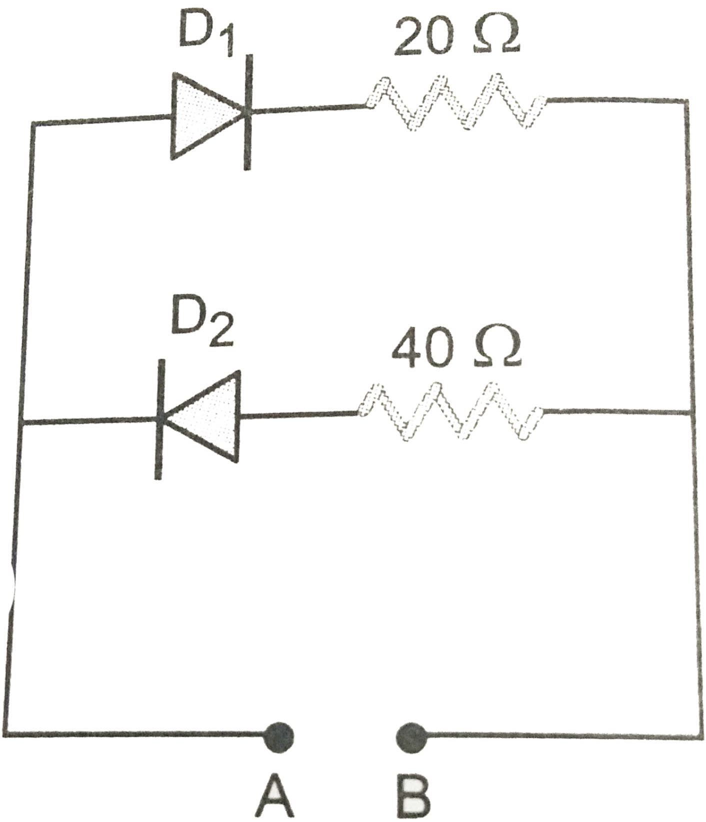
28. Figure Shows a diode connected to an external resistance and an e.m.f. Assuming that the barrier potential developed in diode is $0.5V$, obtain the value of current in the circuit in milliampere.



Watch Video Solution

29. A battery of $1.5V$ may be connected across the point A and B as shown in Fig . What is the current drawn from the battery if the positive terminal of the battery is connected to the point A and the point B. The junction diodes D_1 and

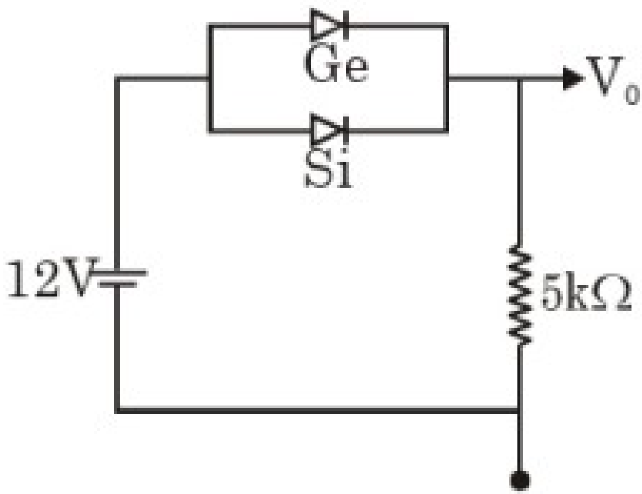
D_2 used are ideal diodes.



Watch Video Solution

30. Calculate the value of output voltage V_0 (in V) if the Si diode and Ge diode conduct at $0.7V$ and $0.3V$ respectively.

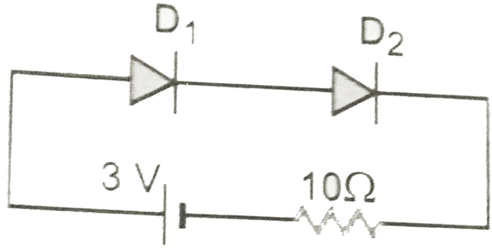
Fig.

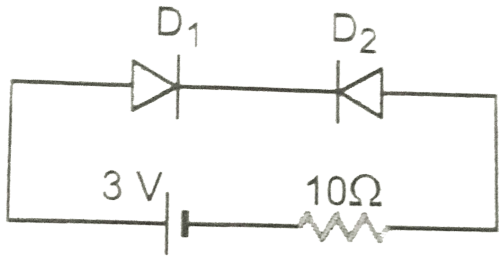


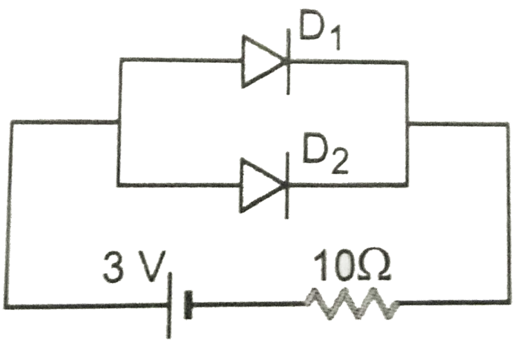
Watch Video Solution

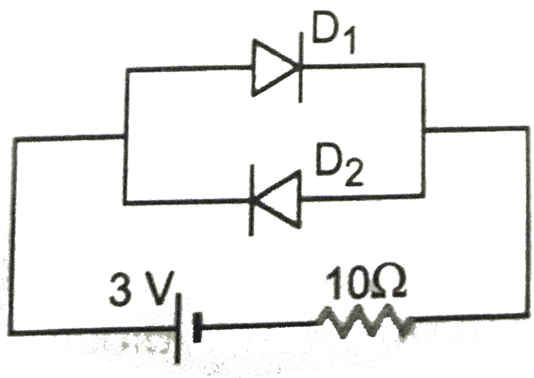
31. Find the total current in the circuits shown in Fig. , , and .

Each diode used is ideal

(a)


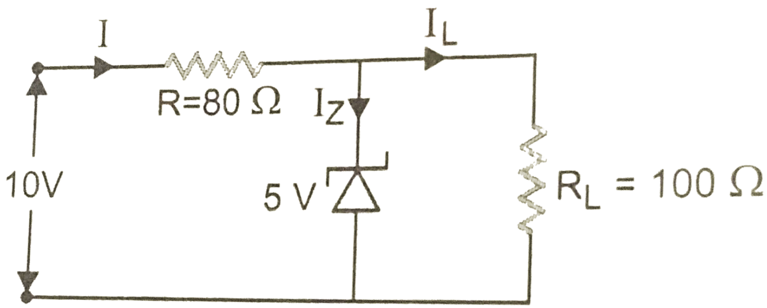
(b)


(c)


(d)


Watch Video Solution

32. In the Fig. find out the current passing through R_L and zener diode.



Watch Video Solution

33. A full wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at 25Ω. The transformer r.m.s. secondary voltage from centre tap to each end of the secondary is $50V$ and load current (ii) the rms value of load current.

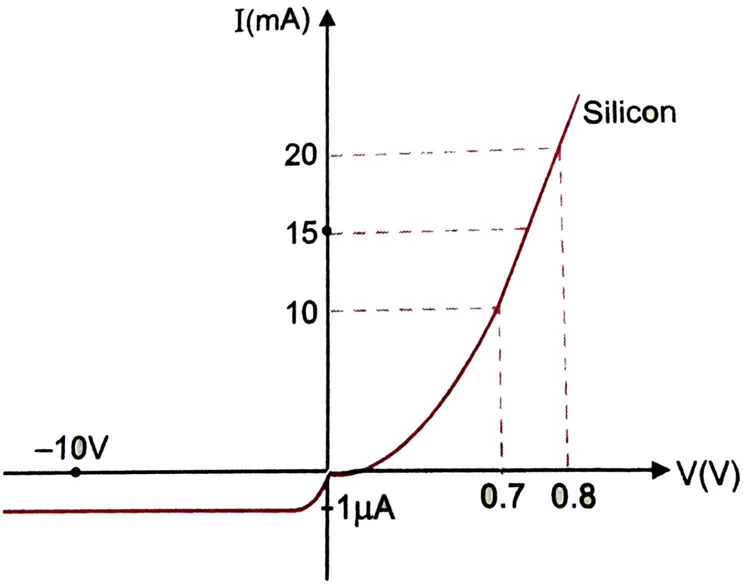
Watch Video Solution

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

Watch Video Solution

35. The V-I characteristics of a silicon diode is shown in the Fig. . Calculate the resistsnce of the diode at $I_D = 15mA$

and $V_D = -10V$.



Watch Video Solution

36. In a zener regulated power supply a zener diode with $V_z = 6.0V$ is used for regualtion. The load current is to eb 4.0 mA and the unregulated input is 10.0 V . What should be the value of series resistor R?

Watch Video Solution

37. A $6V$ zener diode along with a series resistance R is connected accrose a $12V$ supply. Calculate the minimum value of the resistance R required, if the maximum zener current is $30mA$.

Watch Video Solution

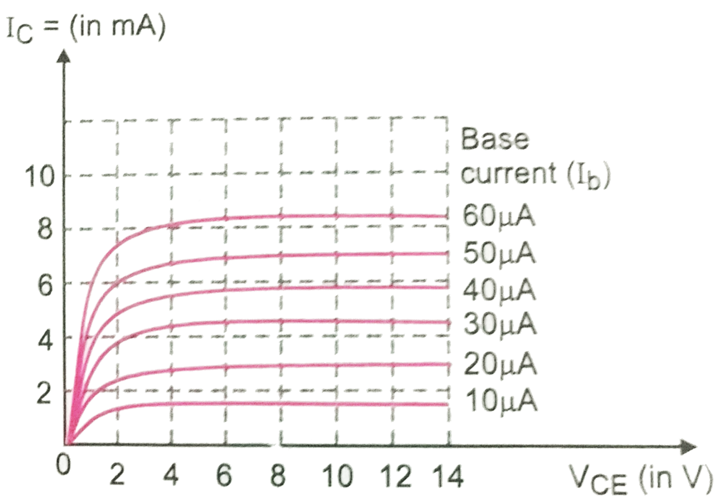
38. The current gain in common emitter amplifier is 59. If the emitter current is $6.0mA$, find, (i) base current (ii) collector current.

Watch Video Solution

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

Watch Video Solution

40. From the output characteristics of common emitter circuit shown in Fig., calculate the value of β_{ac} and β_{dc} of the transistor when V_{cE} is $10V$ and $I_c = 4.0mA$.



Watch Video Solution

Watch Video Solution

41. The potential difference across the collector of a transistor, used in common emitter mode is $1.5V$, with the collector resistance of $3k\Omega$. Find (i) the emitter current and (ii) the base current, if d.c. gain of the transistor is 50.

Watch Video Solution

42. A transistor has a current gain of 50. If the collector resistance $5k\Omega$. Calculate the output voltage if input voltage is $0.01V$.

Watch Video Solution

43. For a CE- transistor amplifier , the audio signal voltage across the collector resistance of $2k\Omega$ is 2 V . Suppose the current amplifiaction factor of the transistor is 100 . Find the input signal voltage and base current , if the base resistance is $1k\Omega$.

Watch Video Solution

44. The current gain of a transistor in a common base arrangement is 0.95. Find the voltage gain and power gain if the load resistance of output circuit is $400k\Omega$ and the input resistance is 200Ω.

Watch Video Solution

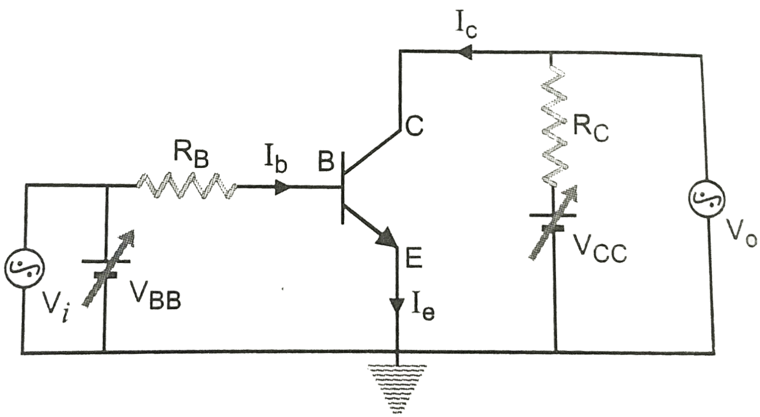
45. In a silicon transistor, a change of $7.89mA$ in the emitter current produce a change of 7.8 mA in the collector current. What change in the base current is necessary to produce an equivalent change in the collector current?

Watch Video Solution

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

Watch Video Solution

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



Watch Video Solution

48. An n - p- n transistor is connected in common - emitter configuraration in which collector supply is 8 V and the voltage drop across the load resistance of 800Ω connected in the collector circuit is 0.8 V . If current amplification factor is 25 , determine collector - emitter voltage and base current . If the internal resistance of the transistor is 200Ω , calculate the voltage gain and the power gain.

Watch Video Solution

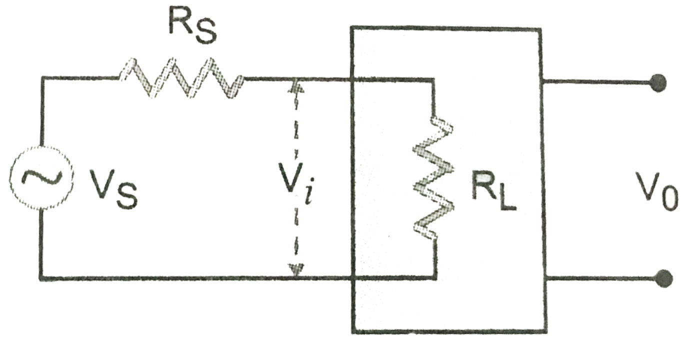
49. A potential barrier of 0.4V exists across a p-n junction. If the depletion region is $4.0 \times 10^{-7} m$ wide, what is the intensity of the electric field in this region? If an electron with speed $4.5 \times 10^5 m/s$ approaches the p-n junction from the n-side, find the speed with which it will enter the p-side.

Watch Video Solution

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

Watch Video Solution

51. An amplifier is represented by the circuit shown in Fig. Here r_i is the input resistance of the amplifier and the voltage V_i is appearing across it. This voltage is amplified by a factor A_V and appears across the load as voltage V_0



An external voltage V_s is applied at the input terminals of the amplifier via series resistance R_S. What will be the apparent gain $A_V(= V_0/V_s)$ of the ampilifier in terms of A_V, R_S and r_i.

Watch Video Solution

52. What is the decimal number of binary number $(111001.01)_2$?

Watch Video Solution

53. What is the binary additon of $(101010)_2$ and $(010101)_2$?

Watch Video Solution

54. Subtract $(10101)_2$ from $(111001)_2$.

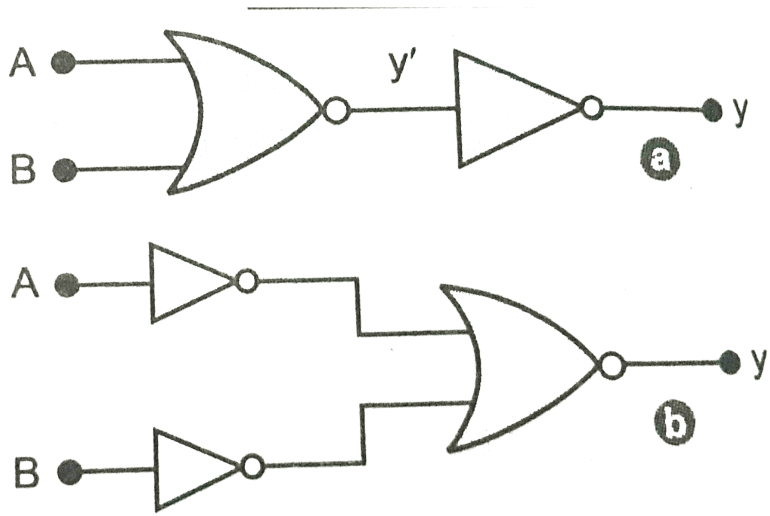
Watch Video Solution

55. The truth table shown below is for which of the following gates:

$NaND$	A	B	Y
AND	1	1	0
XOR	1	0	1
NOT	0	1	1
	0	0	1

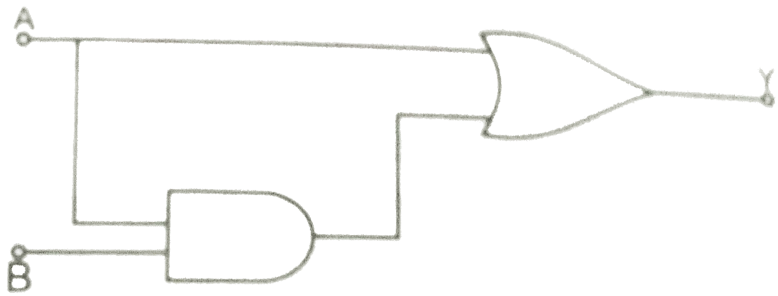
Watch Video Solution

56. You are given the two circuits as shown in Fig. and . Show that circuit acts as OR gate while the circuit acts as AND gate.



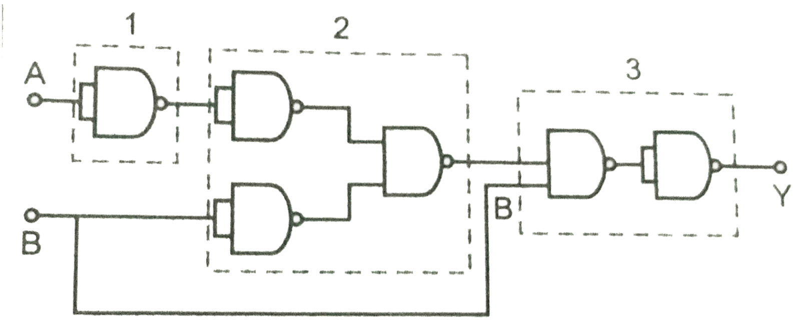
Watch Video Solution

57. Express by a truth table, the output Y for all possible input A and B in the following circuit Fig.



Watch Video Solution

58. Identify which basic gate, OR, AND and NOT is represented by the circuits in the dotted line boxes 1, 2 and 3 Fig.



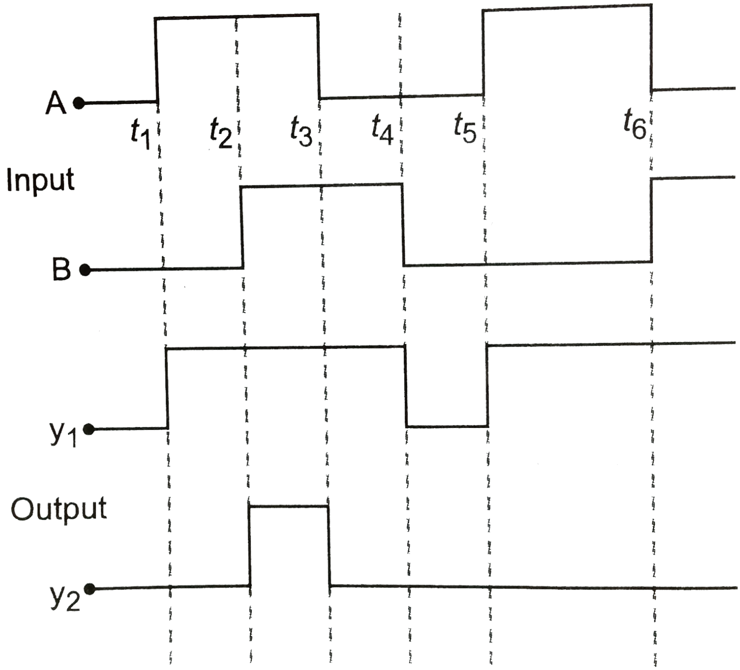
Watch Video Solution

59. Let A, B and C be any three logic variables, prove the following Boolean identity.

$$A.\,B.\,C + A.\,\overline{B}.\,C + A.\,B.\,\overline{C} = A.\,(B + C)$$

Watch Video Solution

60. A student has to use an appropriate number of (i) NAND gates (only) to get the output y_1 (ii) NOR gates (only) to get the output y_2 from two given input A and B as shown in the Fig.



Identify the 'equivalent gate' needed in each case. Show how one can connect an appropriate number of (i) NAND (ii) NOR gates respectively in the two cases to gat the equivalent gates.

Watch Video Solution

61. The metallic conductors are opaque. Why?

Watch Video Solution

62. Out of the ionic, covalent and metallic and van der Waal's solids, which will be widely used to produce a conductor, semiconductor and insulator?

Watch Video Solution

63. C, Si and Ge have same lattice structure. Why is C insulator,

while Si and Ge intrinsic semiconductors ?

Watch Video Solution

64. Discuss the quantum states of sodium crystal having N atoms.

Watch Video Solution

65. Assertion : An N-type semiconductor has a large number of electrons but still it is electrically neutral.

Reason: An N-type semiconductor is obtained by doping an intrinsic semiconductor with a pentavelent impurity.

Watch Video Solution

66. A p-type semiconductor has a large number of holes but still it is electrically neutral. Explain.

Watch Video Solution

Watch Video Solution

67. A doped semiconductor has impurity levels $40meV$ below the conductor band. Is the material n-type or p-type? In a thermal collision, an amount kT of energy is given to the extra electron loosely bound to the impurity ion and this electron is just able to jump into the conduction band. Calculate the temperature T. Given $k = 8.62 \times 10^{-5} eV / K$.

Watch Video Solution

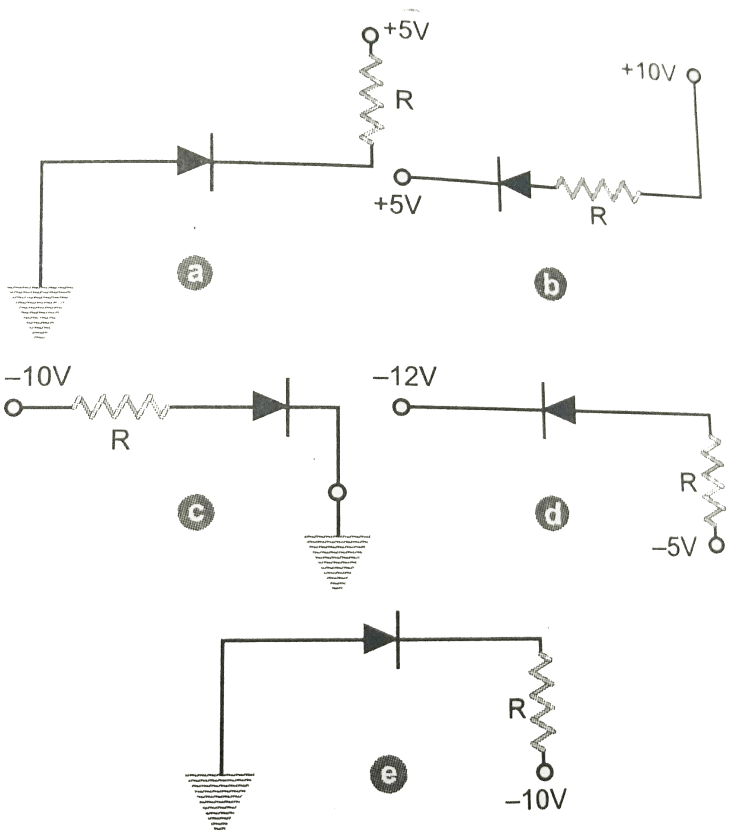
68. A hole created father below the top of valence band has higher energy than created at the top of valence band. Explain.

Watch Video Solution

69. The resistance of p-n junction is low when forward biased and is high when reverse biased. Explain.

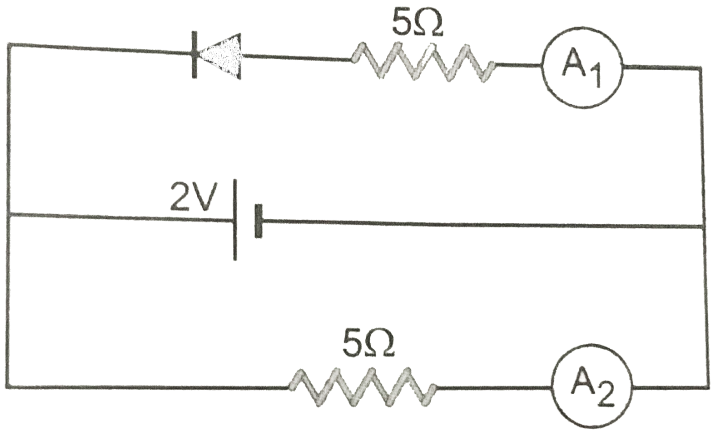
Watch Video Solution

70. In the following Fig., , , and (e), which of the diode are forward biased and which are reverse biased and why?



Watch Video Solution

71. What are the reading of ammeters A_1 and A_2 shown in Fig.? Neglect the resistances of the ammeters, when the p-n junction used is ideal one.



Watch Video Solution

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

Watch Video Solution

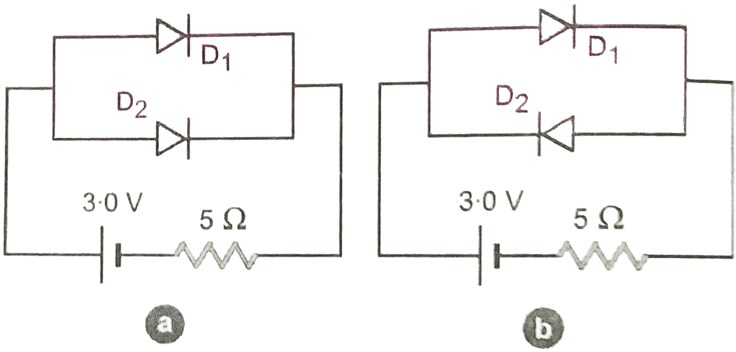
73. A zener diode has a contract potential of $0.8V$ in the absence of biasing. It undergoes zener breakdown for an electric field of $10^6 V m^{-1}$ at the depletion region of p-n junction. If the width of the depletion region is 2-4mu m, what should be the reverse biased potential for the zener breakdown to occur?

Watch Video Solution

74. The applied input a.c. power to a half wave retifier I 100 watt. The d.c. output power obtained is 40 watt. (i) What is the rectification efficiency and (ii) What is the power efficiency?

Watch Video Solution

75. Determine the current through the resistancees of the circuit shown in Fig.. The each p-n junction used is ideal one.



Watch Video Solution

76. A 3V battery may be connected across the point A and B as shown in Fig. Assume that the resistance of each diode is zero in the forward bias and infinity in the reverse bias. Find the current supplied by the battery if the positive terminal of the battery is connected to the point A the point B.

Watch Video Solution

Watch Video Solution

77. How reverse current suddenly increase at the breakdown voltage in case of zener diode?

Watch Video Solution

78. What do the acronyms LASER and LED stands for? Name the factor which determines (i) frequency and (ii) intensity of light emitted by LED.

Watch Video Solution

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

Watch Video Solution

80. In a transistor base is made thin and doped with little impurity atoms. Why?

Watch Video Solution

81. What will happen if emitter be reversebiased and collector be forward biased in a transistor?

Watch Video Solution

82. What will happen if both, emitter and collector of a transistor are reversed biased?

Watch Video Solution

83. What will happen if emitter as well as collector in a transistor are forward biased?

Watch Video Solution

84. Transistor is a temperature-sensitive device. Explain.

Watch Video Solution

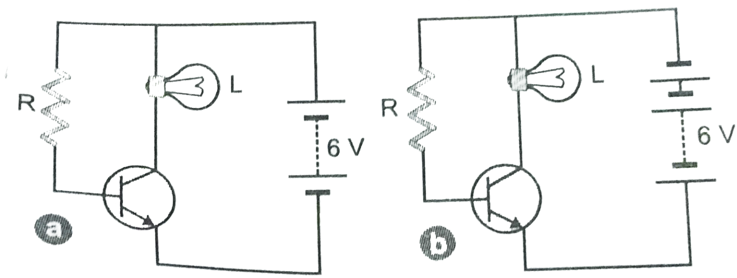
85. A transistor is current operated device. Explain.

Watch Video Solution

86. Explain, why the input resistance of a transistor is low and output resistance is high.

Watch Video Solution

87. In only one of the circuits given below, the lamp L light. Which circuit is it ? Give reason for your answer.

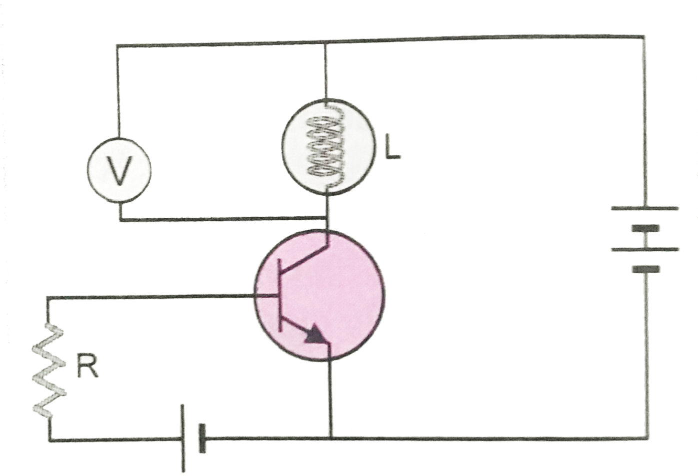


Watch Video Solution

88. If the base region of a transistor is made large, as compared to a usual transistor, how does it affect (i) the collector current and (ii) current gain of this transistor.

Watch Video Solution

89. In the circuit shown in Fig.a voltage V is connected across lamp L. What changes would occur at lamp and the voltage V, if the resistance R is reduced in value?



Watch Video Solution

90. Is the voltage gain of a common-emitter ampilifier constant, irrespective of the magnitude of the input signal? Give reason.

Watch Video Solution

91. How will you test in a simple way whether a transistor is spoiled or in working order?

Watch Video Solution

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

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

Watch Video Solution

93. Discuss how a NOT gate is realised using NAND gates.

Watch Video Solution

94. Dicuss how the AND gate is realised from the NAND gate.

Watch Video Solution

95. Dicuss how the OR gate is realised from the NAND gate.

Watch Video Solution

96. Dicuss how the OR gate is realised from the NOR gate.

Watch Video Solution

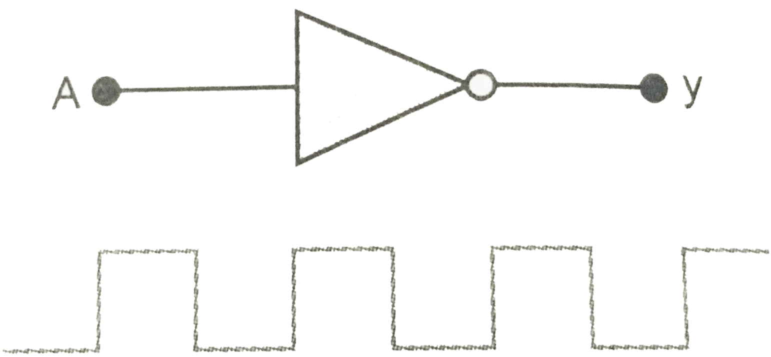
97. Dicuss how the AND gate is realised from the NOR gate.

Watch Video Solution

98. The output of a two NAND gates is fed as input to an OR gate. Write the truth table for the final output of combination. Name this new logic gate.

Watch Video Solution

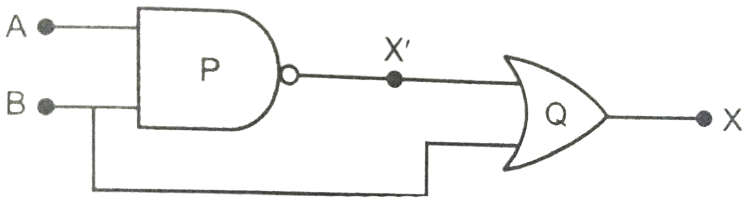
99. In Fig., circuit of a logic gate and input waveform is shown. (i) Name the logic gate (ii) Write its truth table and (iii) give the output wavefrom.



Watch Video Solution

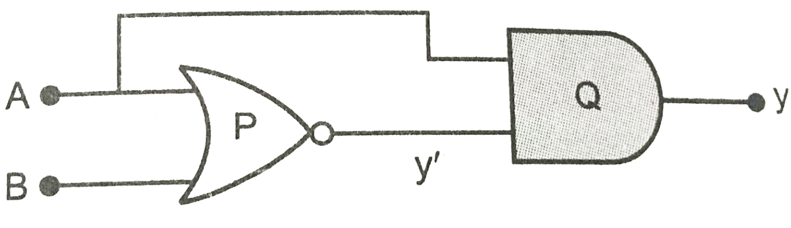
Watch Video Solution

100. Identify the logic gates marked P and Q in the circuit Fig. Write the truth table for this combination.



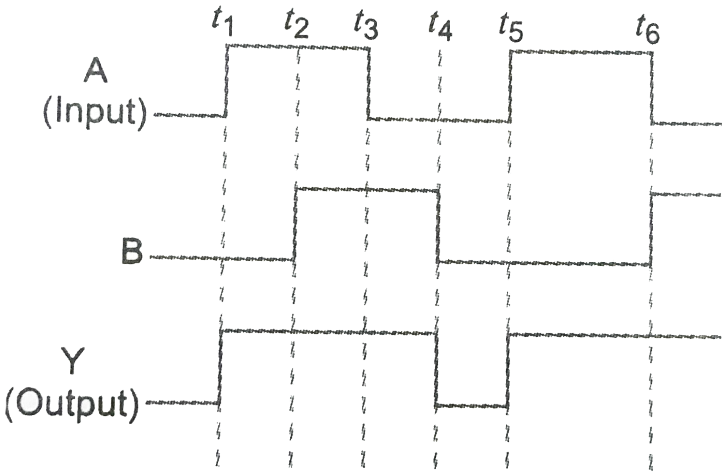
Watch Video Solution

101. Write the truth table for the combination of the gates shown in Fig. Name the gates used.



Watch Video Solution

102. Justify the output wavefrom (y) of the OR gate for input and as gives in Fig.

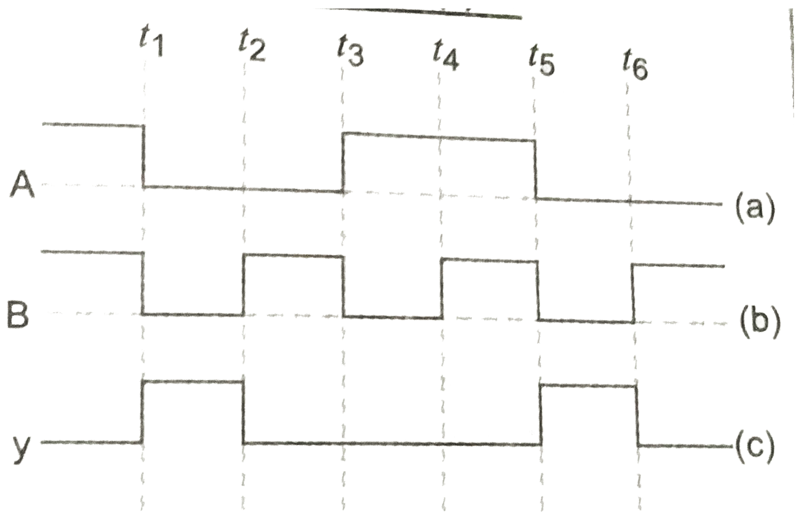


Watch Video Solution

103. Sketch the output Y from NAND gate having input A A and B given below, Fig.

Watch Video Solution

104. Sketch the output y from a NOR gate having input A and B as given in Fig.



Watch Video Solution

105. Establish the Boolean identity

$$A.\,C + A.\,B.\,C = A.\,C$$

Watch Video Solution

106. Establish the Boolean identity

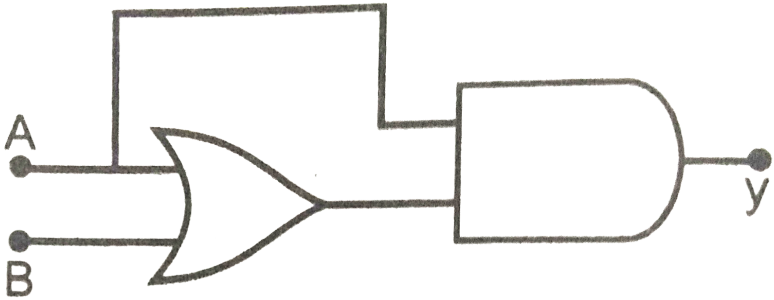
$$A.\,B + A.\,B.\,C + \bar{.}\,B + A.\,\bar{.}\,C = B + A.\,C$$

Watch Video Solution

107. The output of an OR gate is connected to both the input of a NAND gate. Draw the logic circuit of this combination of gates and write its truth tablr.

Watch Video Solution

108. Construct the truth table for the function y of A and B represented in Fig.



Watch Video Solution

109. The output of an OR gate is connected to both the input of a NOR gate. Draw the lodic circuit of the combination and write the truth table.

Watch Video Solution

110. According to energy band diagram, what makes a substance conductor insulator?

Watch Video Solution

111. What is fermi level and fermi energy?

Watch Video Solution

112. Where does the fermi-level of intrinsic semiconductor lie?

Watch Video Solution

113. What is doping?

Watch Video Solution

114. Why doping is done in semiconductor?

Watch Video Solution

115. The forbidden energy gap of germanium is 0.72eV. What do you understand by it?

Watch Video Solution

116. Stonsium (Sn) and silicon (Si) both belong to group IV elements but Sn is a metal whereas Si is a semiconductor. Why?

Watch Video Solution

117. Why diamond behaves like an insulator?

Watch Video Solution

118. Why do Ge and Si are semiconductor?

Watch Video Solution

119. The forbidden energy band gap in conductors, semiconductors and insulators are EG_1, EG_2 and EG_3 respectively. How are they related?

Watch Video Solution

120. Is ohm's law obeyed in semiconductors or not?

Watch Video Solution

121. Out of electron and hole, which one has highter mobility and Why?

Watch Video Solution

122. Name the charge carriers in the following at room temperature : (i) Conductor (ii) Intrinsic semiconductor (iii) Insulator.

Watch Video Solution

123. How does the forbidden energy gap of an intrinsic semiconductor vary with the increase in temperature

Watch Video Solution

124. Why is n-type semiconductor of Ge so called?

Watch Video Solution

125. Why is p-type semiconductor of Ge so called?

Watch Video Solution

126. How does the energy gap of an intrinsic semiconductor vary, when doped with a trivalent impurity?

Watch Video Solution

127. What are donor impurity atoms and acceptor impurity atoms?

Watch Video Solution

128. How does the energy gap of an instrinsic semiconductor vary, when doped with a pentavalent impurity?

Watch Video Solution

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

Watch Video Solution

130. A semiconductor has equal electron and hole concentration of $6 \times 10^4 m^{-3}$. On doping with a certain impurity, electron concentration increases to $8 \times 10^{12} m^{-3}$. Identify the type of semiconductor.

Watch Video Solution

131. What type of charge carriers are there in n-type semiconductor?

Watch Video Solution

132. What type of charge carriers are there in p-type semiconductor?

Watch Video Solution

133. A semiconductor has equal electron and hole concertration $6 \times 10^{8} m^{-3}$. On doping with a certain impurity electron concertration increase to $8 \times 10^{12} m^{-3}$. Identify the type of semiconductor after doping.

Watch Video Solution

Watch Video Solution

134. Give the ratio of number of holes and the number of conduction electrons in a (i) pure semiconnductor (ii) n-type semiconductor and (iii) p-type semiconductor.

Watch Video Solution

135. What is the location of donor energy levels in the energy band diagram of n-type semiconductor.

Watch Video Solution

136. What is the location of acceptor energy levels in the energy band diagram of p-type semiconductor.

Watch Video Solution

137. What factor determine the electrical conductivity of metal?

Watch Video Solution

138. What are the safe limits of temperature for germanium and silicon?

Watch Video Solution

139. Pieces of copper and germanium are cooled from room temperature to 80K. What will be the effect on their resistance?

Watch Video Solution

140. On doping germanium with donor atoms of density $10^{17} cm^{-3}$, find its conductivity in mho/cm, if $\mu = 3800 cm^2 / V - s$.

Watch Video Solution

141. Mention some properties of semiconductors.

Watch Video Solution

142. Why is the conductivity of n-type semiconductor greater than that of the p-type semiconductor even when both of

these have the same level of doping?

Watch Video Solution

143. What happens when a forward bias is applied to a p-n junction

Watch Video Solution

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

Watch Video Solution

145. Can we measure the potential difference of a p-n junction by putting a sensitive voltmeter across its terminals?

Watch Video Solution

146. In the depletion region of an unbiased p-n junction diode, what are the charge carriers?

Watch Video Solution

147. What is the direction of diffusion current in a junction diode?

Watch Video Solution

148. If the forward bias on p-n junction is increased from zero to 0.05V, then no current in the circuit flows. What is the contact potential of junction diode?

Watch Video Solution

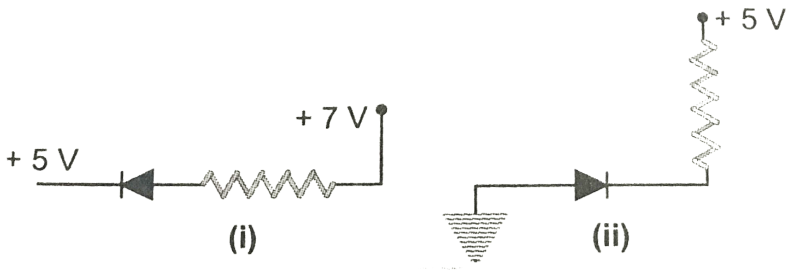
149. What is the ratio of forward and reverse resistance of p-n junction diode?

Watch Video Solution

150. Why are photodiodes used preferably in reverse bias condition?

Watch Video Solution

151. In the following circuits, Fig., which one of the two diodes is forward biased and which is reverse biased.



Watch Video Solution

152. What is solar cell?

Watch Video Solution

153. The output of an unregulated dc power supply is to be regulated. Name the device that can be used for this purpose.

Watch Video Solution

154. Which type of biasing result in very high resistance of p-n junction diode? Draw a diagram showing this bias.

Watch Video Solution

155. What is zener breakdown?

Watch Video Solution

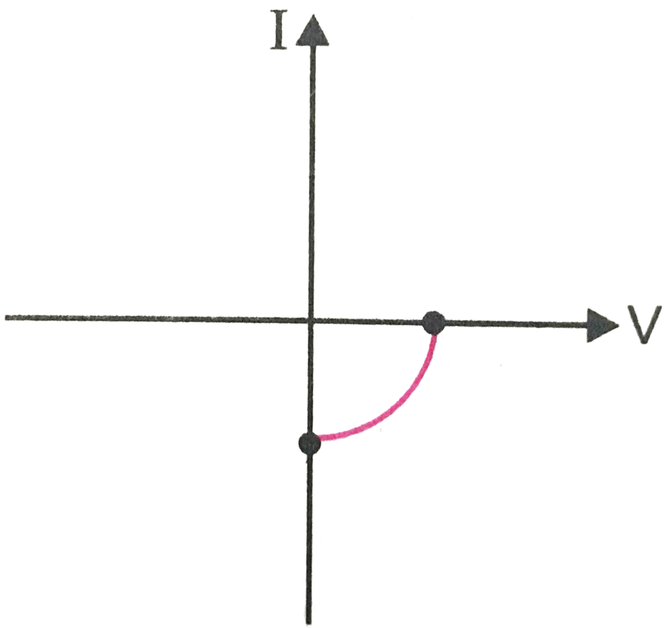
156. What is an ideal junction diode?

Watch Video Solution

157. An ideal junction diode acts as a switch. Explain.

Watch Video Solution

158. Name the junction diode whose I-V characteristics are drawn below:



Watch Video Solution

Watch Video Solution

159. Why is the transistor called a junction transistor?

Watch Video Solution

160. In a transistor, emitter is always orward biased. Why?

Watch Video Solution

161. Is transistor a current controlled or temperature controlled device?

Watch Video Solution

162. Define current amplification factor in a common emitter mode of transistor.

Watch Video Solution

163. What is the phase relationship in the output and input voltage in the common base transistor amplifier.

Watch Video Solution

164. What is the phase relationship between collector and base voltage in common-emitter configuration.

Watch Video Solution

165. Define transconductance of a transistor. On what factor does it depend?

Watch Video Solution

166. Can two p-n junction diodes placed back to back work as a p-n-n transistor?

Watch Video Solution

167. In n-p-n transistor, what are the current carriers inside and outside the transistor circuit?

Watch Video Solution

168. In p-n-p transistor, what are the current carriers inside and output the transistor circuit?

Watch Video Solution

169. Would you prefer to use a transistor as a common base or a common emitter amplifier?

Watch Video Solution

170. Derive a relation between current gain of common emitter amplifier.

Watch Video Solution

171. In an n-p-n transistor circuit, the collector current is 9 mA. If 90% of the electrons emitter reach the collector, find the base current and collector current.

Watch Video Solution

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

Watch Video Solution

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

Watch Video Solution

174. What is feed back?

Watch Video Solution

175. What do you understand by (i) positive feed back and (ii) negative feed back?

Watch Video Solution

176. By increasing load resistance, can we increase or not, the gain of a transistor indefinitly?

Watch Video Solution

177. Power gain of transistor amplifier with common base circuit or common emitter circuit is large. Does it mean the power is generated by the transistor? Explain.

Watch Video Solution

178. What is the condition for the state of saturation of a transistor?

Watch Video Solution

179. How is a transistor biased to be in active state?

Watch Video Solution

180. Under what condition a transistor works as an open switch?

Watch Video Solution

181. Out of the transistors n-p-n and p-n-p which one is more commonly used and why?

Watch Video Solution

182. In a transistor, the area of base-collector junction is made large than the area of the emitter-base junction. Why?

Watch Video Solution

183. When a transistor is used as an oscillator, why is it necessary to feed back energy to L-C circuit?

Watch Video Solution

184. Three amplifier circuit are connected in series. The voltage gain of each is 5. What is the final voltage amplification?

Watch Video Solution

185. In a transistor, doping level in base is increased slightly. How will it affect (i) collector current and (ii)base current?

Watch Video Solution

186. How does the voltage gain vary with the frequency of the input signal for a transistor amplifier?

Watch Video Solution

187. Name the type in which the electronic circuit have been classified.

Watch Video Solution

188. State the rule used in the operation of OR gate.

Watch Video Solution

189. State the rule used in the operation of AND gate.

Watch Video Solution

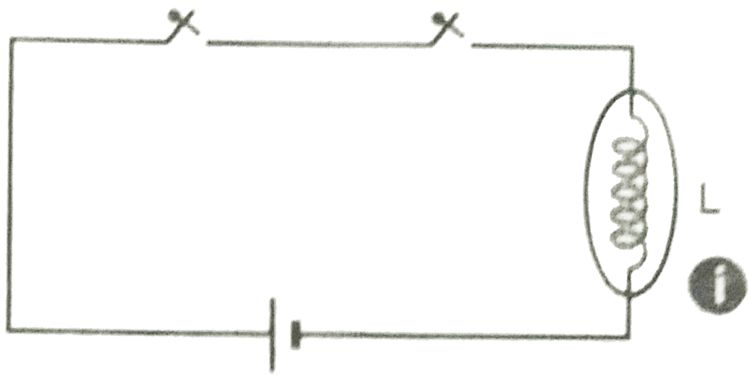
190. State the rule used in the operation of NOT gate.

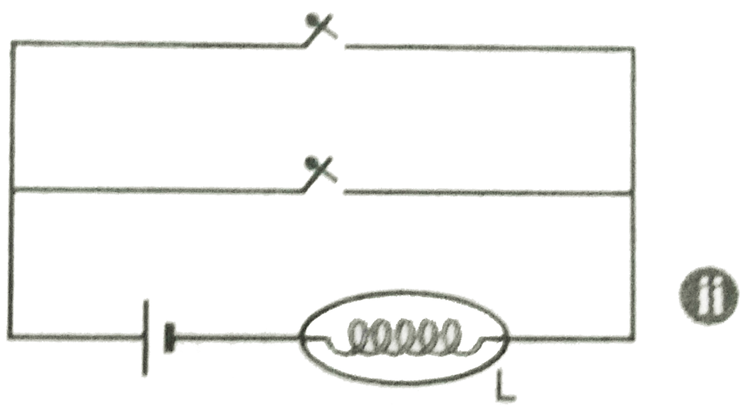
Watch Video Solution

191. What is the difference between analogue and digital circuit?

Watch Video Solution

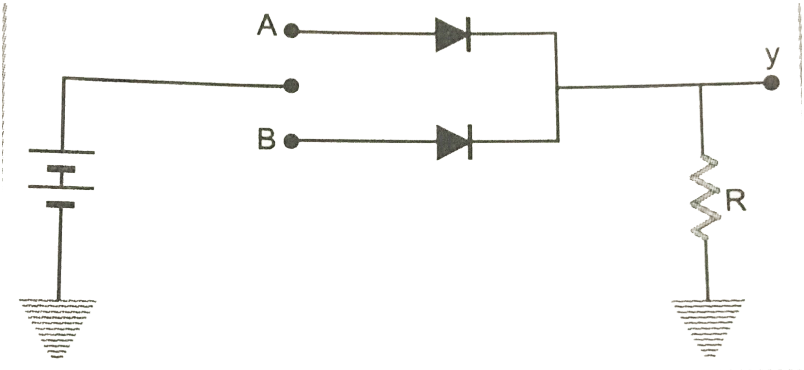
192. In the circuit shown , a switch which is open represents the logic state 0 and the switch which is closed represents the logic state 1. The lampL is lit when output is logic state 1. What type of gates are represented by the circuits in (i) and (ii) of Fig.





Watch Video Solution

193. Name the logic gate realised using p-n junction diode in the given Fig.Give its logic symbol.



Watch Video Solution

194. What is the output y for a gate, when

$y = \overline{\overline{A. B}}$?

Watch Video Solution

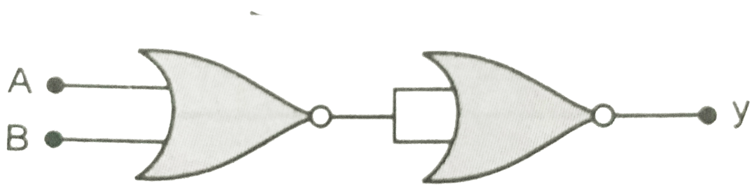
195. How 2-input NAND gate can be converted into a NOT gate?

Watch Video Solution

196. How many NAND gates are required to realise (i) OR gates and (ii) AND gate.

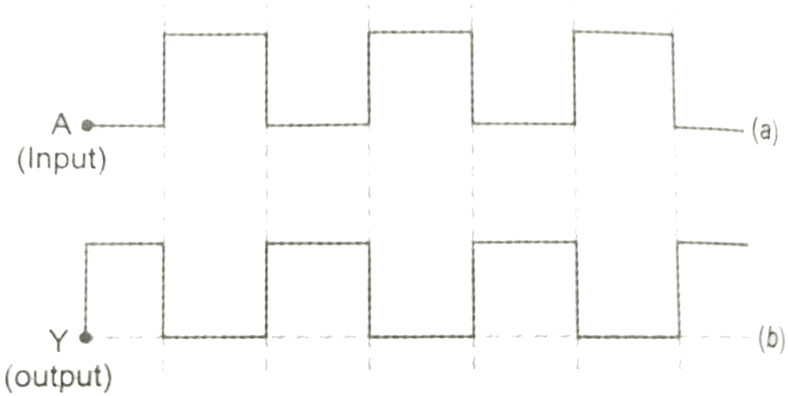
Watch Video Solution

197. Draw the logic symbol of the gate given below:



Watch Video Solution

198. The input wave form for NOT gate is shown in Fig.Draw the output wave form of this gate.



Watch Video Solution

199. What is integrated circuit?

Watch Video Solution

200. Write the full form of the terms (i) MSI and (ii) LSI used for different types of integrated circuits.

Watch Video Solution

201. Write the full form of the terms (i) SSI and (ii) VLSI used for different types of integrated circuits.

Watch Video Solution

202. Name the category of the integrated circuit which is utilizing the circuit components (i) ≤ 100 and (ii) ≤ 1000.

Watch Video Solution

203. Distinguish between electrons and holes.

Watch Video Solution

204. Why is the semiconductor damaged by a strong current?

Watch Video Solution

205. Define a hole. State its characteristics.

Watch Video Solution

206. Which semiconductor has more mobility : p-type or n-type ? Explain.

Watch Video Solution

207. Distinguish between n-type and p-type semiconductors on the basis of energy-band diagram.

Watch Video Solution

208. Distinguish between intrinsic and extrinsic semi-conductors on the basis of energy band diagram.

Watch Video Solution

209. The energy gap of silicon is 1.14 eV. Find the maximum wavelenth at which silicon starts energy absorption.

Watch Video Solution

210. How is an n-type semiconductor formed? Name the major change carriers in it. Draw the energy band diagram of n-type semiconductor.

Watch Video Solution

211. The ratio of number density of free electrons to holes for two different materials, A and B, are (i) equal to one and (ii) less than one respectively. Name the type of semiconductor to which A and B belong. Draw energy level diagram for A and B.

Watch Video Solution

212. How does the energy gap in an instrinsic semiconductor vary, when doped with a pentavalent impurity and a trivalent impurity. Draw their energy band diagrams.

Watch Video Solution

213. 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

214. Carbon and silicon are known to have similar lattice structures. However, the four bonding electrons of carbon are present in second orbit while those of silicon are present in its third orbit. How does this difference result in a difference in their electrical conductivities

Watch Video Solution

215. Is it difficult to make an intrinsic semiconductor?

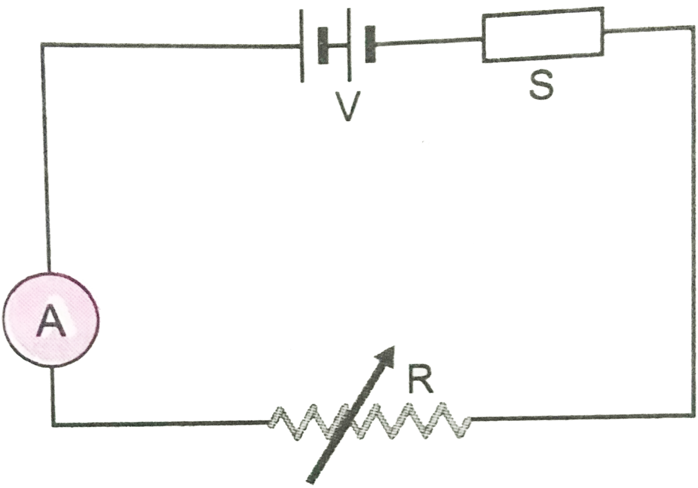
Name two factors on which the electrical conductivity of intrinsic semiconductor at a given temperature depends.

How does the conductivity of a semiconductor change with the rise in its temperature?

Watch Video Solution

216. How does the conductivity and resistivity change with rise of temperature in case of intrinsic semiconductor?

217. The diagram Fig.12 shown a piece of pure semiconductor S in series with a variable resistor R, and a source of constant voltage V. Would you increase or decrease the value of R to keep the reading of ammeter constant, when semi-conductor S is heated? Give reason.



218. What is meant by depletion region in a junction diode? How is this region formed?

Watch Video Solution

219. Distinguish clearly between forward biasing and reverse biasing of p-n junction.

Watch Video Solution

220. Why does the width of depletion layer of a p-n junction increase in reverse biasing?

Watch Video Solution

221. A p-n junction is fabricated from a semiconductor with band gap of $2.8eV$. Can it detect a wavelength of $6000nm$?

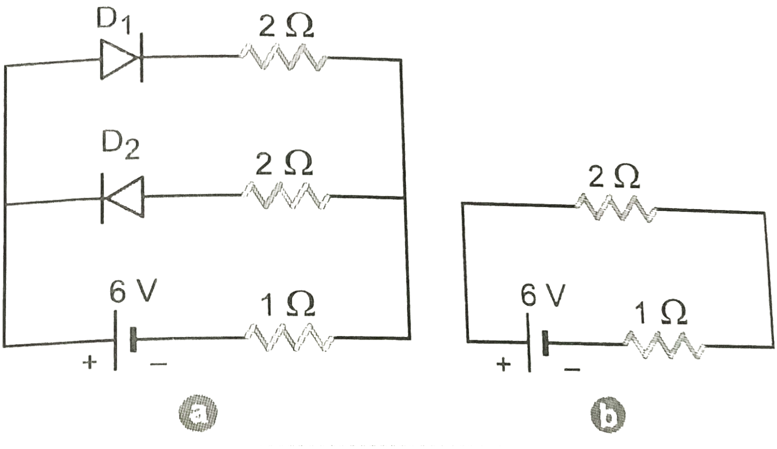
Watch Video Solution

222. Can we take one slab of p - type semiconductor and physically

join it to another n - type semiconductor to get p - n junction?

Watch Video Solution

223. For the circuit shown in Fig., find the current flowing through the 1Ω resistor. Assume that the two diode are ideal diode.

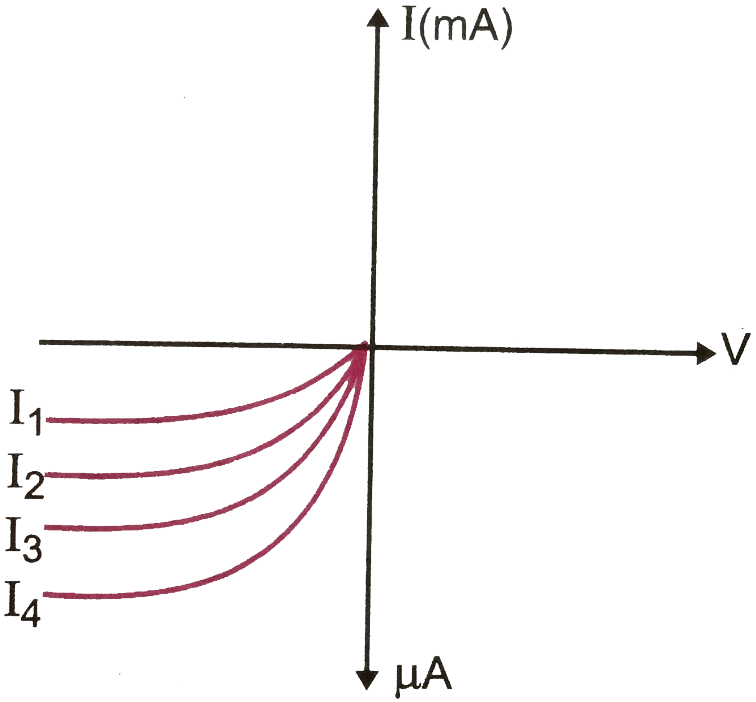


Watch Video Solution

224. The current in the forward bias is known to be more (in mA) than the current in the reverse bias (in μA). What is the reason then to operate the photodiodes in reverse bias?

Watch Video Solution

225. Why is a photodide operated in reverse bias mode? Fig. shown reverse bias current, under different illuminating intensities $I_1 I_2$, I_3 and I_4 for a given photodiode. Average the intensities I_1, I_2, I_3 and I_4 in decreasing order of wavelength.



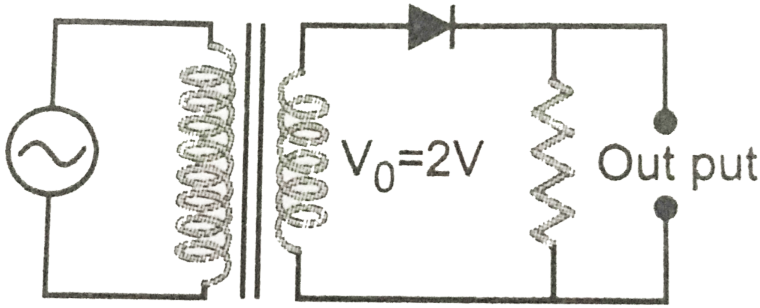
Watch Video Solution

226. Draw V-I characterictics of a p-n junction diode. Why does the reverse current show a sudden increase at the critical voltage?

Name any semiconductor device which operates under the reverse bias in the breakdown region.

Watch Video Solution

227. Consider the half wave rectifier circuit Fig.Assume the diode to be a silicon diode with a thershold voltage of $0.7V$. Draw the output if the input is a sine wave with an amplitude of $2V$.



Watch Video Solution

228. In half wave rectification, if the input frequency is $50Hz$, what is the output frequency? What is the output frequency of a full wave rectifier for the same frequency?

Watch Video Solution

229. Consider a silicon diode with a threshold voltage of $-0.7V$, used as a half wave rectifier. Draw the output if the input is a sine wave from of amplitude $2V$ and circuit is on in reverse position.

Watch Video Solution

230. The potential barrier of silicon at $30^\circ C$ is $0.7eV$. What is its value at $130^\circ C$?

Watch Video Solution

231. Explain the term depletion region and potential barrier for a p-n junction.

Watch Video Solution

Watch Video Solution

232. Give any two difference between a half wave rectifier and a full wave rectifier.

Watch Video Solution

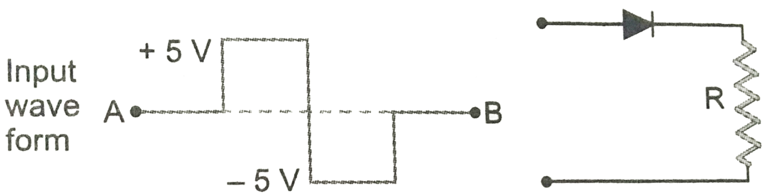
233. Name the p-n junction diode which emit spontaneous radiation when frrward biased. How do we choose the semiconductor, to be used in those diodes, if the emitted rediation is to be in the visible region?

Watch Video Solution

234. In a a .c. input signal, of frequency 60 Hz, is rectified by a (i) half wave, (ii) full wave rectifier. Draw the output wave from and write the output frequency in each case.

Watch Video Solution

235. Draw and explain the output waveform across the load resistor R, if the input wave from is as shown in Fig.



Watch Video Solution

236. Name the semiconductor device that can be used to regulate an irregulation dc power supply. With the help of I-V characteristics of this device, explain its working.

Watch Video Solution

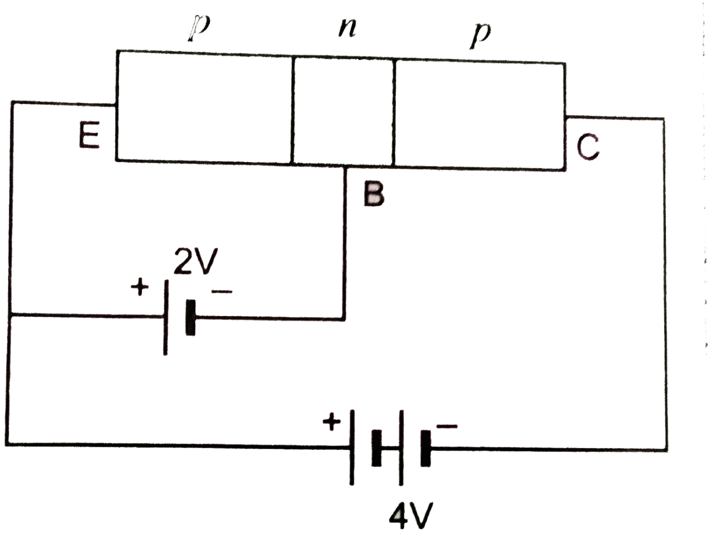
237. Zener diode has higher dopant density as compared to ordinary p-n junction diode. How does if effect (i) the width of depletion layer and (ii) the junction field?

Watch Video Solution

238. Can we interchange emitter and collector of a transistor? Explain.

Watch Video Solution

239. In the p-n-p transistor circuit shown in Fig.

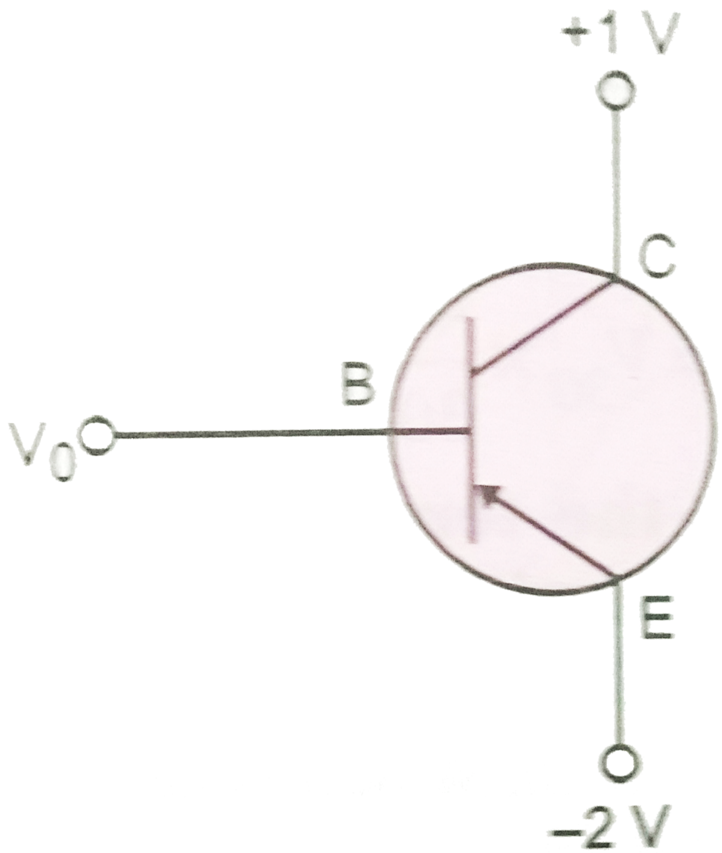


What is the potential difference between base and collector?

What is the nature of biasing between emitter base junction and collector-base junction?

240. In Fig. is (i) the emitter, and

(ii) the collector, forward or reverse biased?



Under what condition does the transistor with CE configuration act as an amplifier?

Watch Video Solution

241. In a transistor connected in a common emitter mode it has, $R_c = 4k\Omega, R_i = 1k\Omega, I_c = 1mA$ and $I_b = 20\mu A$. Find the voltage gain.

Watch Video Solution

242. Transistor does not work in railway carriage. Why?

Watch Video Solution

243. Why transistor can not be used as rectifier?

Watch Video Solution

244. If the emitter and base of npn transistor have same doping concentration, explain how will the collector and base currents be affected?

Watch Video Solution

245. In the working of a transisor, emitter-base junction is forward biased while collector-base junction is reverse biased. Why?

Watch Video Solution

246. What is the function of base region of a transistor? Why is this region made thin and slightly doped?

Watch Video Solution

247. Differentiate between three segment of a transistor on the basis of their size and level of doping.

Watch Video Solution

248. Write the function of three segments of a transistor.

Watch Video Solution

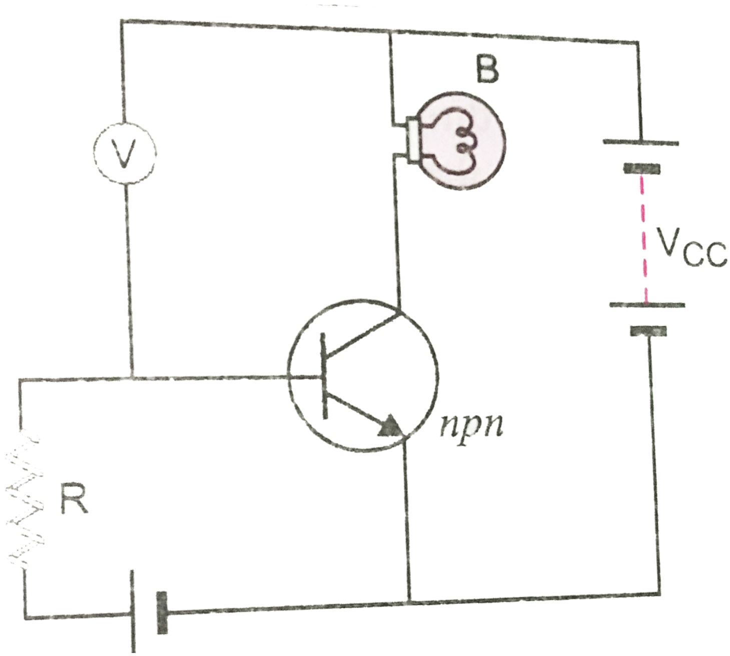
249. In a transistor, forward bias voltage is always low as compared to reverse bias voltage. Why?

Watch Video Solution

250. Draw the transfer characteristic curve of a base biased transistor in CE configuration. Explain clearly how the active region of the V_o versus V_i curve in a transistor is used as an amplifier.

Watch Video Solution

251. In a common emitter transistor circuit, a bulb B and a volmeter V are connected as shown in Fig.What change would take place in bulb B and volmeter V when the value of resistance R is increased?



Watch Video Solution

252. Explain analogue signals and digital signal.

Watch Video Solution

253. What do you understand by logic gate? Why is it so called? State the type of gates.

Watch Video Solution

254. What do you understand by truth table and Boolean expression?

Watch Video Solution

255. Give Boolean expression and Truth table for NOR gate.

Watch Video Solution

256. Give Boolean expression and Truth table for NAND gate.

Watch Video Solution

257. Write the truth table of a two input NOR gate. Explain, using a logic circuit, how a NOR gate can be converted into an AND gate.

Watch Video Solution

258. The output of a 2-inputs NOR gate is fed as input to a NOT gate. Write down the truth table for the final output of the combination.

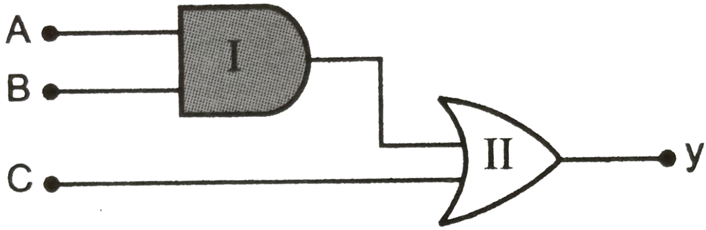
Watch Video Solution

259. 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

260. For the given combination of gates shown in Fig., find the values of output y_1 and y_2 in the table given below Fig.

Identify the gates I and II.



(a)

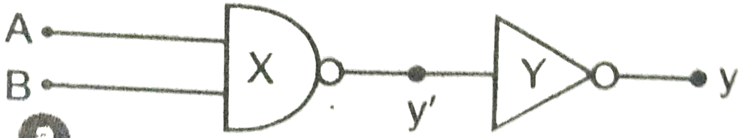
A	B	C	y
0	0	0	y_1
1	1	0	y_2

(b)

Watch Video Solution

261. Identify the logic gates marked X, Y in the given logic circuit Fig. Write down then output at y, when

(i) $A = 0, B = 0$ and (ii) $A = 1, B = 1$.



a

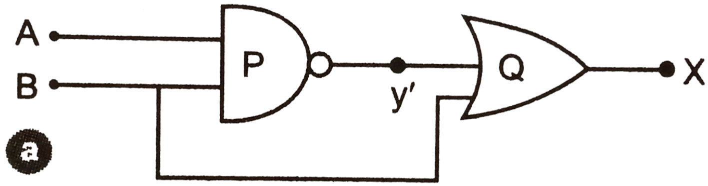
b

A	B	$y'(=\overline{A \cdot B})$	$y = \overline{y'}$
1	1	0	1
0	0	1	0

Watch Video Solution

262. Identify the logic gates marked P and Q in the given logic circuit Fig. Write down then output at X for the inputs

(i) $A = 0, B = 0$ and (ii) $A = 1, B = 1$.



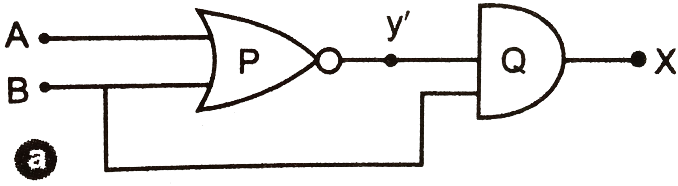
b

A	B	$y'(=\overline{A \cdot B})$	$X = y' + B$
0	0	1	1
1	1	0	1

Watch Video Solution

263. Identify the logic gate markeed P and Q in the given logic circuit Fig . Write down the output at X for the inputs

(i) $A = 0, B = 0$ and (ii) $A = 1, B = 1$.

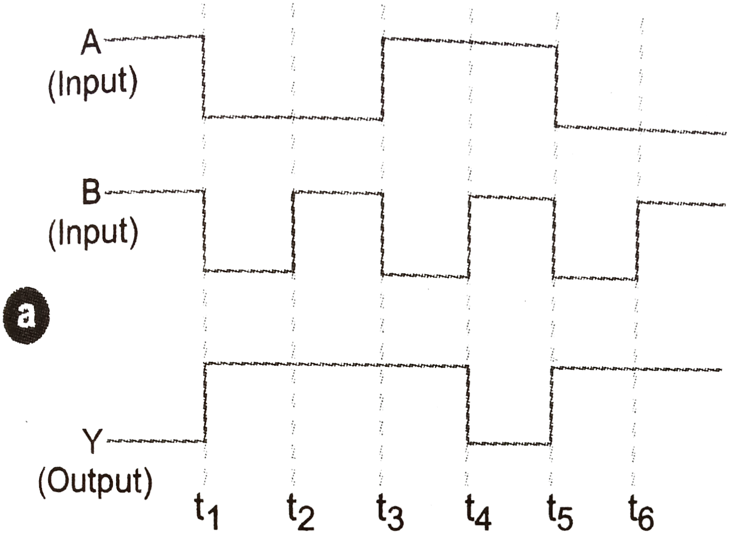


b

A	B	$y'(=\overline{A+B})$	$X = y' \cdot B$
0	0	1	0
1	1	0	0

Watch Video Solution

264. The following Fig. shows the input waveforms (A,B) and the output waveform (y) of a gate. Identify the gate and write its truth table.

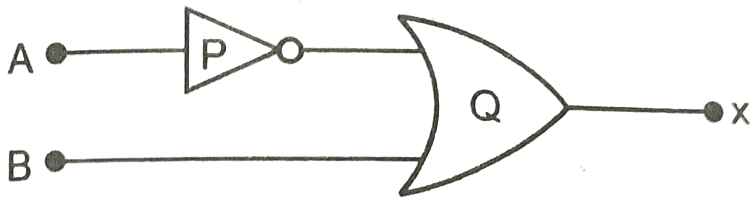


b

	A	B	$y = \overline{A \cdot B}$
At $t < t_1$	1	1	0
For t_1 to t_2	0	0	1
For t_2 to t_3	0	1	1
For t_3 to t_4	1	0	1
For t_4 to t_5	1	1	0
For t_5 to t_6	0	0	1

Watch Video Solution

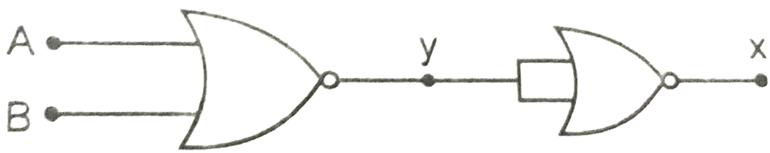
265. (i) Identify the logic gates marked P and Q in the given logic circuit Fig.



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

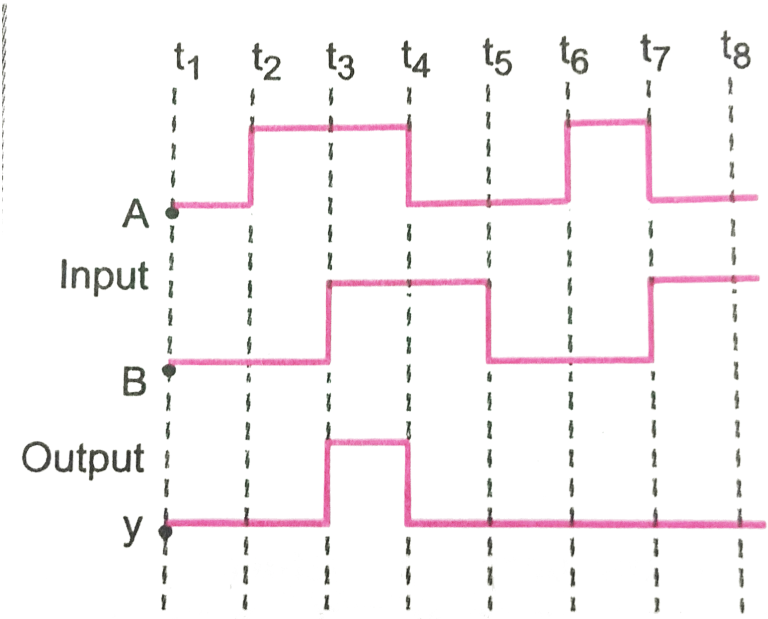
Watch Video Solution

266. Drawn the output waveform at X, using thye given inputs A and B for the logic circuit shown in Fig. Also identify the logic operation performed by this circuit.



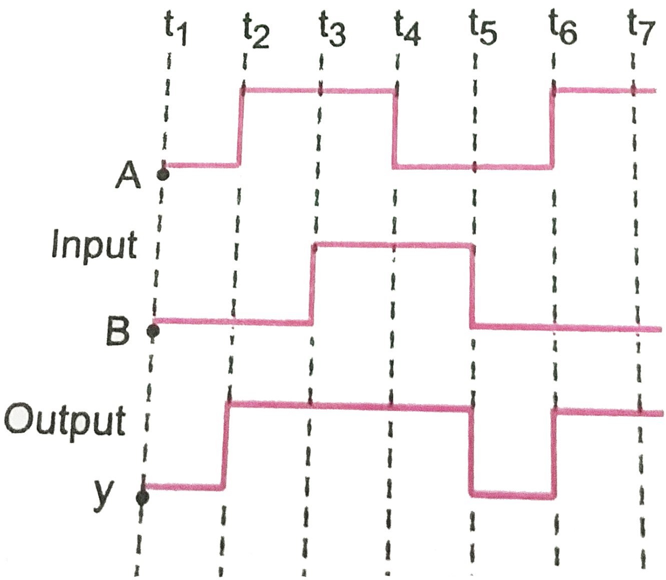
Watch Video Solution

267. The Fig.shows the input wavwforms A and B for 'AND' gate. Draw the output waveform and write the truth table for this logic gate.



Watch Video Solution

268. The Fig shown input waveforms A and B to a logic gate. Draw the output waveform for an OR gate. Write the truth table for this logic gate and draw its logic symbol.



Watch Video Solution

269. Using a suitable combination from a NOR, an OR and a NOT gate, draw circuits to obtain the truth table given below

(i)

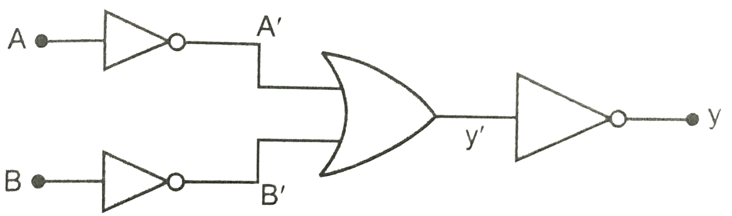
A	B	y
0	0	0
0	1	0
1	0	1
1	1	0

(ii)

A	B	y
0	0	1
0	1	1
1	0	0
1	1	1

Watch Video Solution

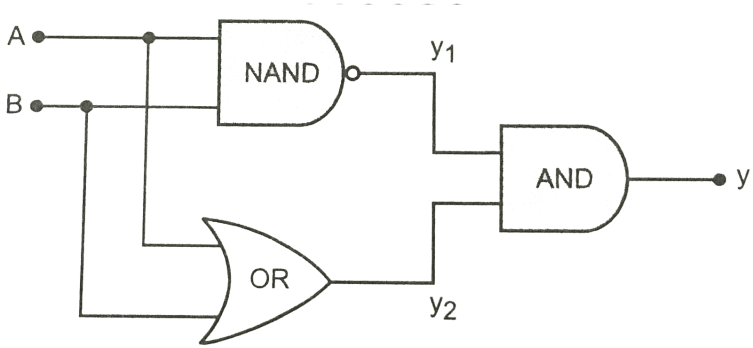
270. Input A and B are applied to the logic gate set up as shown in Fig.Complete the truth table given below and name the equivalent gate formed by this set up.



A	*B*	*A′*	*B′*	*y*
0	0			
0	1			
1	0			
1	1			

Watch Video Solution

271. Write the truth table for the circuit shown in Fig. Name the gate of which this circuit is performing.



Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

273. Which of the statements given in above example is true for p - type semiconductors ?

Watch Video Solution

274. Carbon , silicon and germanium have four valence elcectrons each . These are characterised by valence and conduction bands separated by energy band - gap respectively equal to $(E_g)_c (E_g)_{si}$ and $(E_g)_{Ge}$. Which of the following statements ture ?

A. $(E_g)_{Si} < (E_g)_{Ge} < (E_g)$

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

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

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

Watch Video Solution

275. In an unblased p-n junction, holes diffuse from the p - region to n- region because

A. free electrons in the n-region attract them

B. they move across the junction by the potential difference

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

D. all the above.

Watch Video Solution

276. When a forward bias is applied to a p -n junction. It

A. raises the potential barrier

B. reduces the majority carrier current to zero

C. lower the potential barrier

D. none of the above.

Watch Video Solution

277. For transistor action, which of the following statements are correct ?

A. collector current is equal to the sum of base current and emitter current

B. The input resistance depends upon the current I in the transistor.

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

D. Both the emitter junction as well as the collector junction are forward biased.

Answer: B::C

Watch Video Solution

278. For transistor amplifier, the voltage gain

A. remains constant for all frequencies

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

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

D. None of the above.

Answer: C

Watch Video Solution

279. In half - wave rectification, what is the output frequency, if the

input frequency is 50 Hz ? What is the output frequency of a full - wave rectifier

for the same input frequency ?

Watch Video Solution

280. For a CE- transistor amplifier , the audio signal voltage across the collector resistance of $2k\Omega$ is 2 V . Suppose the current amplifiaction factor of the transistor is 100 . Find the input signal voltage and base current , if the base resistance is $1k\Omega$.

Watch Video Solution

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

Watch Video Solution

282. A p-n junction is fabricated from a semiconductor with band gap of $2.8eV$. Can it detect a wavelength of $6000nm$?

Watch Video Solution

283. The number of silicon atoms per $m^3 is 5 \times 10^{28}$. This is doped simultaneously with 5×10^{22} atoms per m^3 of Arsenic and $5 \times 10^{20} per m^3$ atoms of indium. Calculate the number of electrons and holes. Given that $n_i = 1.5 \times 10^{16} m^{-3}$. Is the material n-type or p-type?

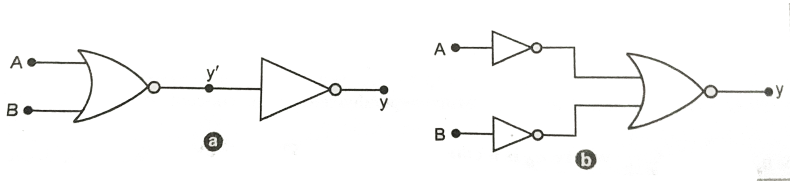
284. In an intrinsic semiconductor, the energy gap E_g of an intrinsic semiconductor is 1.2 eV. Its hole mobility is very much smaller than electron mobility and is indepndent of temperature. What is the ratio between conductivity at 600K and at 300K? Assume that the temperature dependence of intrinsic concentration n_i is expressed as,

$n_i = n_o e^{-E'_g / k_B} T$, where n_o is constant and E'_g is an energy equal to $E_g / 2$,

$k_B = 8.62 \times 10^{-6} eV K^{-1}$.

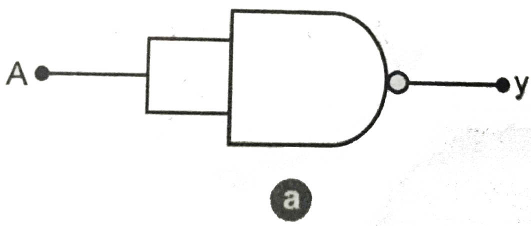
Watch Video Solution

285. You are given two circuit as shown in Fig. and . Show that circuit acts as OR gate while the circuit acts as AND gate



Watch Video Solution

286. Write the truth table for a NAND gate as given in Fig.9. Hence identify the exact logic operation carried out by this circuit.

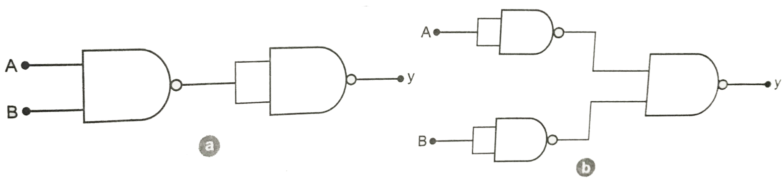


A	B
1	0
0	1

b

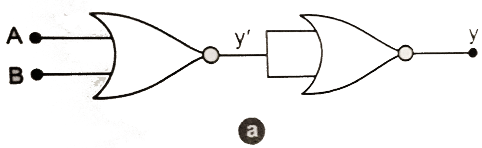
Watch Video Solution

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



Watch Video Solution

288. Write the truth table for circuit given in Fig.below consisting of NOR gates and identify the logic operation (OR, AND and NOT) which this circuit is performing.



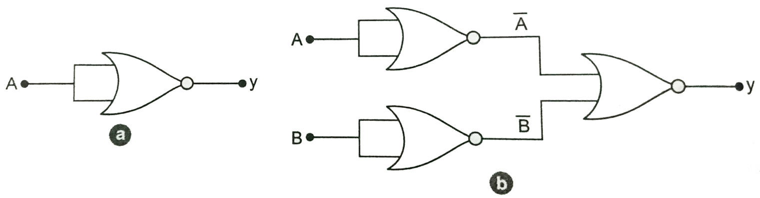
b

A	B	y'	y
0	0	1	0
1	0	0	1
0	1	0	1
1	1	0	1

Watch Video Solution

Watch Video Solution

289. Write the truth table for the circuit given in Fig., consisting of NOR gates only. Identify the logic operations (OR, AND, NOT) performed by two circuits.



Watch Video Solution

290. A doped semiconductor has impurity levels $40 meV$ below the conductor band. Is the material n-type or p-type? In a thermal collision, an amount kT of energy is given to the extra electron loosely bound to the impurity ion and this

electron is just able to jump into the conduction band. Calculate the temperature T. Given $k = 8.62 \times 10^{-5} eV / K$.

Watch Video Solution

291. Predict effect on the electrical properties of a silicon crystal at room temperature if every millionth silver atom is replased by an atom of indium. Given, concentration of silicon atoms $= 5 \times 10^{28} m^{-3}$, Intrinsic carrier concentration

$= 1.5 \times 10^{16} m^{-3}$, $\mu e = 0.135 m^2 / Vs$ and $\mu_h = 0.048 m^2 / Vs$

.

Watch Video Solution

292. If resistivity of pure silicon is $3000\Omega m$, and the electron and hole mobilities are $0.12 m^2 V^{-1} s^{-1}$ and $0.045 m^2 V^{-1} s^{-1}$ respectively, determine the resistivity of a specimen of the material when 10^{19} atoms of phosphorous are added per m^3 are also added. Given charge on electron $= 1.6 \times 10^{-19} C$.

Watch Video Solution

293. In an intrinsic semiconductor, the energy gap E_g of an intrinsic semiconductor is 1.2 eV. Its hole mobility is very much smaller than electron mobility and is indepndent of temperature. What is the ratio between conductivity at 600K and at 300K? Assume that the temperature dependence of intrinsic concentraction n_i is expressed as,

$n_i = n_o e^{-E_g' / k_B T}$, where n_o is constant and E_g' is an energy equal to $E_g / 2$,

$k_B = 8.62 \times 10^{-6} eVK^{-1}$.

Watch Video Solution

294. A $10V$ Zener diode along with a seriers resistance R is connected across a $40V$ supply. Calculate the minimum value of the resistance, ar required, if the maximum Zener current is $50mA$.

Watch Video Solution

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

Watch Video Solution

296. A full wave rectifier uses two diode, the internal resistance if each diode is 20Ω. The transformer rms seconary voltage from centre tap tp each end of secondary is 50 V and load resistance is 980Ω. Find (i) the mean load current (ii) the rms value of load current.

Watch Video Solution

297. A potential barrier of $0.60V$ exixts across a p-n junction. If the depletion region is $6.0 \times 10^{-7}m$ wide, what is the intensity of the electric field in this region. An electrin with speed $5.0 \times 10^5 ms^{-1}$ approaches the p-n junction from the n-side, with what speed will it enter p-side.

Watch Video Solution

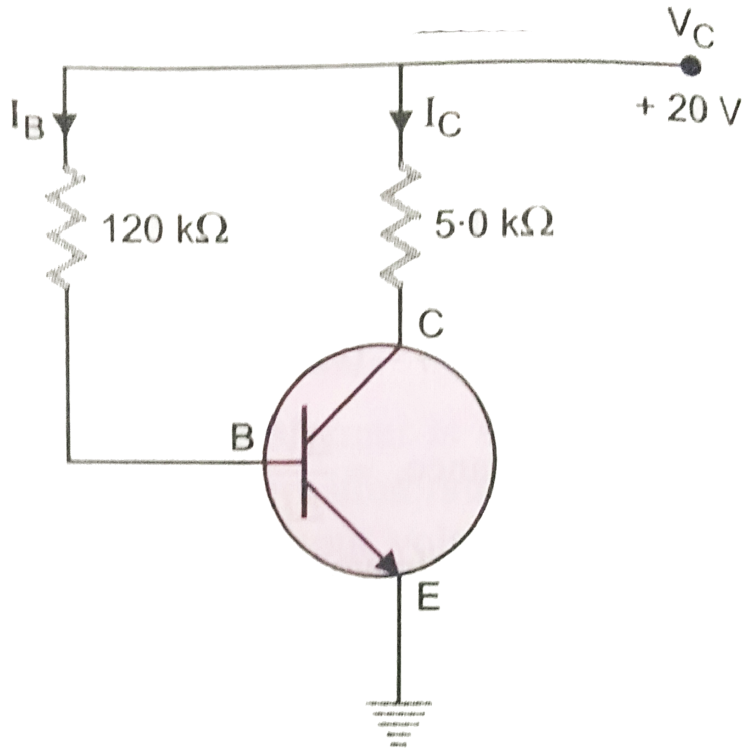
298. A transistor is used in common-emitter mode in an amplifier circuit. When a signal of 30mV is added to the base-emitter voltage, the base current changes by $30\mu A$ and collector current by 3mA. The load resistance is$5k\Omega$. Calculate (i) the current gain β_{ac} (ii) the input resistance R_{BE} (iii) transconductance and (iv) voltage gain.

Watch Video Solution

299. A n-p-n transistor is connected in common emitter configuration in which collector supply is 9V and the voltage drop across the load resistance of 700Ω connected to the collector circuit is 0.7V. If the current amplification factor alpha is $25/26$, determine collector emitter voltage and base current. If the input resistance of the transistor is 100Ω, calculate the voltage gain and the power gain.

Watch Video Solution

300. In the circuit Fig. the value of beta is 200. Find I_B, V_{CE}, V_{BE} and V_{BC}, when $I_C = 2.5mA$. The transistor is in active, cut off or saturation state.

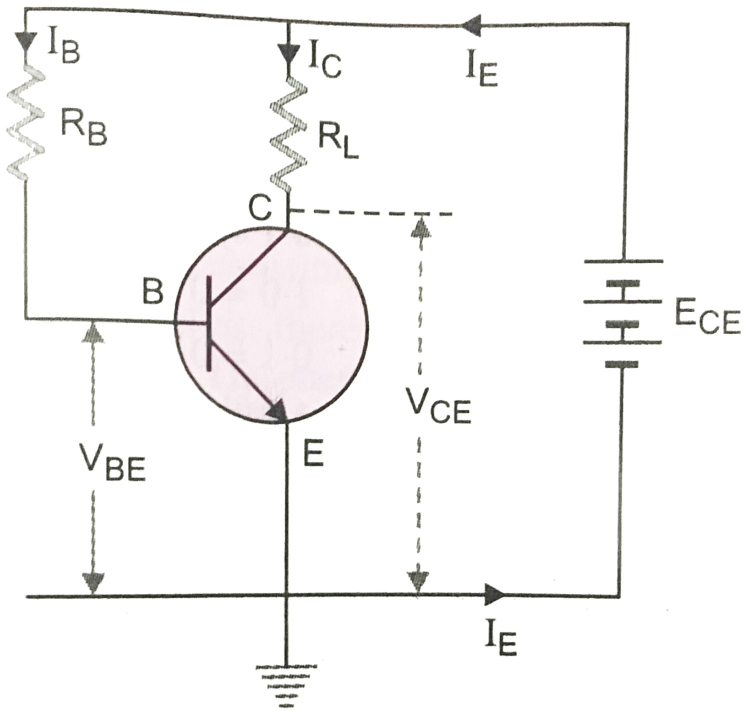


Watch Video Solution

301. In the circuit shown in Fig. $E_{CE} = 5.5V, R_L = 1k\Omega, R_= 500k\Omega$, the base current, I_B is

$10\mu A$ and collector current, $I_C = 5.2mA$. Can this transistor circuit be used as an amplifier?

What happens if the resistance R_L is 500Ω and I_B, I_C and R remain the same as above.



Watch Video Solution

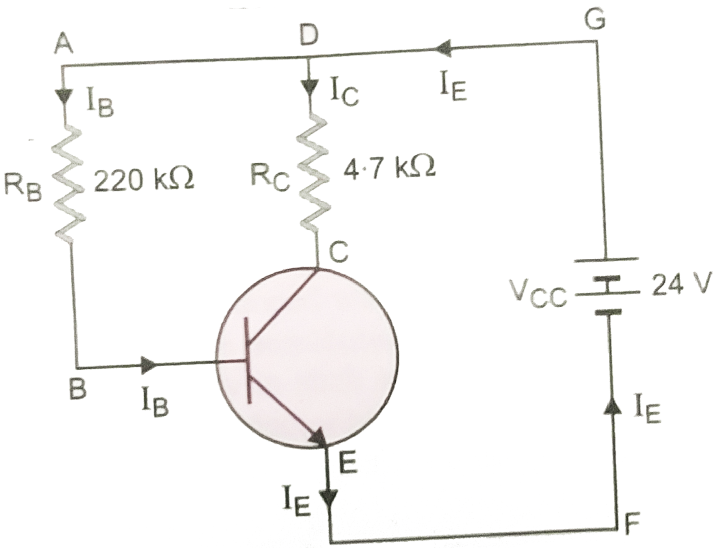
302. In the circuit shown in Fig.

if we assume that when the input voltage at the base resistance is $5V$, V_{BE} is zero and V_{CE} is also zero. What is $I_{,} I$ and beta?

When the input is zero, then I is zero. What would be the output wave form if the input wave form is as shown in Fig.

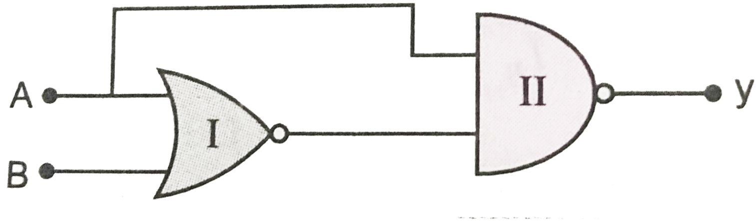
Watch Video Solution

303. In the common emitter circuit as shown in Fig, the value of the current gain is 100. Find $I_B, V_{CE}, V_{BE}, V_{BC}$ when $I_C = 1.5mA$. The transistor is in active, cutoff or saturation state.



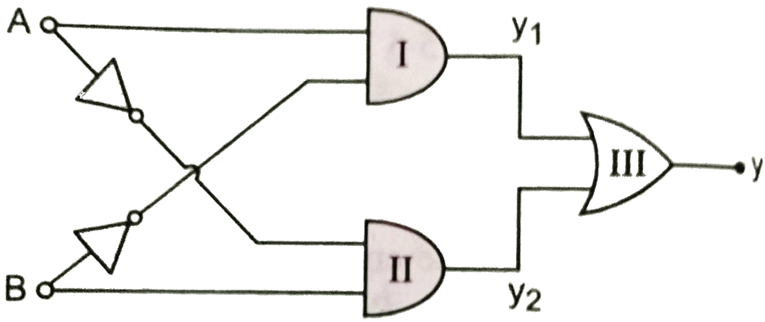
Watch Video Solution

304. Write the Boolean expression and construct the truth table for the function y of A and B in Fig.



Watch Video Solution

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



Watch Video Solution

306. Why are elemental dopants for Silicon or Germanium usually chosen from group XIII or group XV?

Watch Video Solution

307. Sn, C, Si and Ge are all group XIV elements . Yet , Sn is a conductor , C is an insulator while Si and Ge are semiconductors . Why?

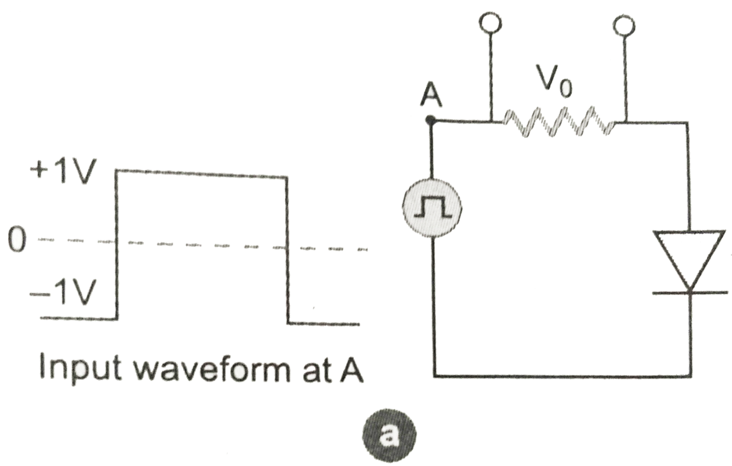
Watch Video Solution

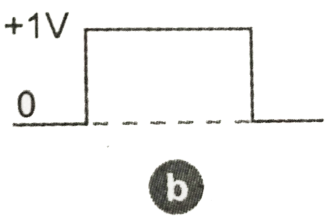
308. Can the potential barrier across a p-n junction be measured by simply connecting a voltmeter across the junction ?

Watch Video Solution

Watch Video Solution

309. Draw the output waveform across the resistor (Fig.)





Watch Video Solution

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

(i) if dc supply voltage is 10V ?

(ii) if dc supply voltage is 5V?

Watch Video Solution

311. In a CE transistor amplifier there is a current and voltage and gain associated with the circuit. In other words there is a power gain. Considerind power a measure of energy, does the circuit violate conservation of energy?

Watch Video Solution

312. (i) Name the type of a diode whose characteristics are shown in Fig.and Fig.

(ii) What does the point P in Fig. represent?

(iii) What does the point P and Q in Fig. represent?

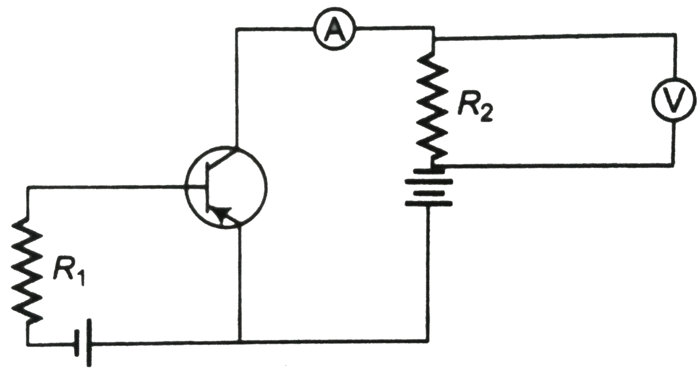
Watch Video Solution

313. Three photodiodes D_1, D_2 and D_3 are made of semiconductors having

band gaps of $2.5eV, 2eV$ and 3 eV , respectively . Which one will be able to detect light of wavelength 6000Å ?

Watch Video Solution

314. If the resistance R_1 is increased , how will the readings of the ammeter and voltmeter change?



Watch Video Solution

315. Two car garages have a common gate which needs to open automatically when a car enters either of the garages or cars enter both. Devise a circuit that resembles this situation using diodes for the situation .

Watch Video Solution

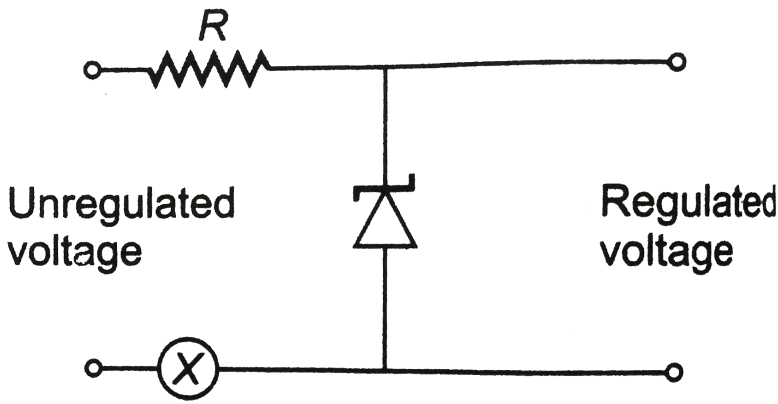
316. How would you set up a circuit to obtain NOT gate using a transistor?

Watch Video Solution

317. Explain why elemental semiconductor cannot be used to make visible LEDs.

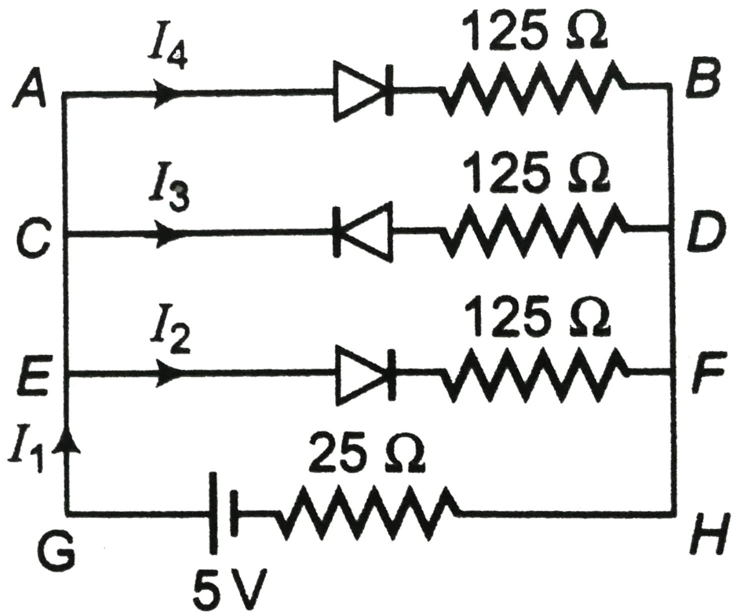
Watch Video Solution

318. A Zener of power rating 1 W is to be used as a voltage regulator. If Zener has breakdown of 5 V and it has to regulate voltage which flucated between 3V and 7V , what should be the value of R for the safe operation.



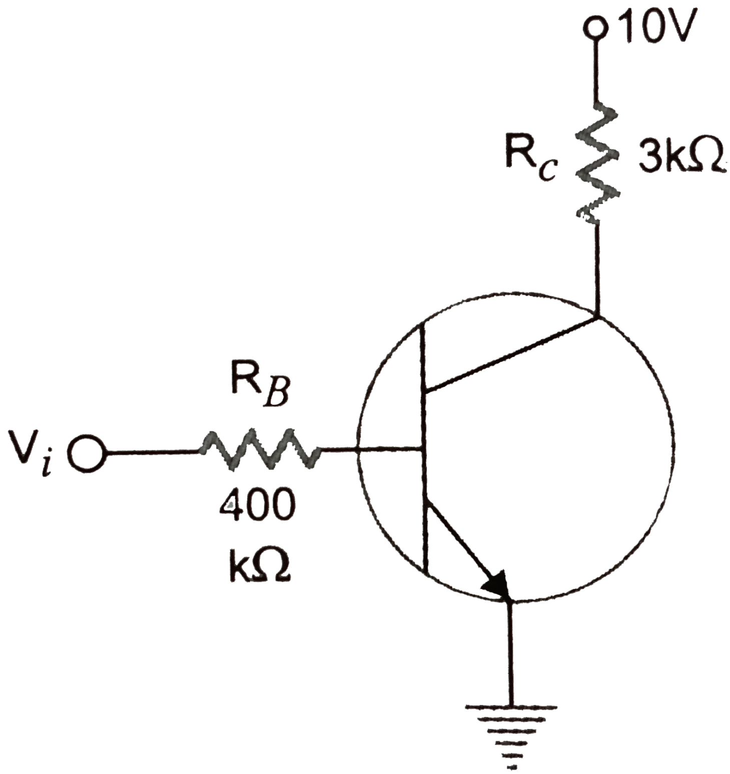
Watch Video Solution

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



Watch Video Solution

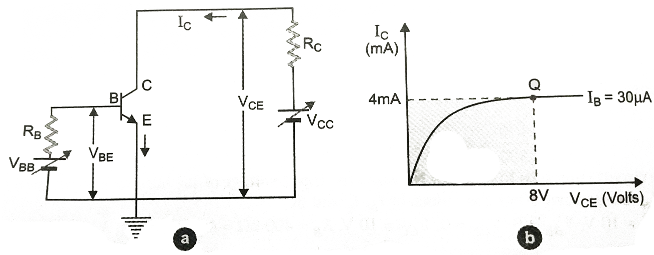
320. In the circuit shown in Fig. when the input voltage of the base resistance is $10V$, V_{be} is zero and V_{ce} is also zero. Find the values of $I_{,}I$ and β.



Watch Video Solution

321. Consider the circuit arrangnent shown in Fig. for studying input and output characteristics of npn transistor in CE configuration.

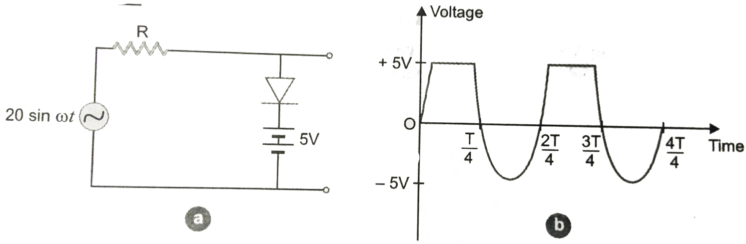
Select the values of R and R for a transistor whose $V_{BE} = 0.7V$, so that the transistor is operating at point Q as shown in the characteristics shown in Fig.



Given that the input impedance of the transistor is very small and $V_{CC} = V_{BB} = 16V$, also find the voltage gain and power gain of circuit making appropriate assumptions.

Watch Video Solution

322. Assuming the ideal diode, draw the output waveform for the circuit given in Fig.Explain the waveform.



Watch Video Solution

323. Suppose a 'n'- type wafer is created by doping Si crystal having $5 \times 10^{28} \text{atoms} / m^3$ with 1 ppm concentration of As. On the surfabe 200 ppm Boron is added to create 'p' region in this wafer. Considering $n_i = 1.5 \times 10^{16} m^{-3}$, (i) Calculate the densities of the charge carriers in the n & p regions. (ii) Comment which charge carriers would contribute largely for the reverse saturation current when diode is reverse biased.

Watch Video Solution

324. An X-OR gate has following truth table:

It is represented by following logic relation

$y = \overline{A}.\,B + A.\,\overline{B}$

Build this gate using AND, OR and NOT gates.

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

Watch Video Solution

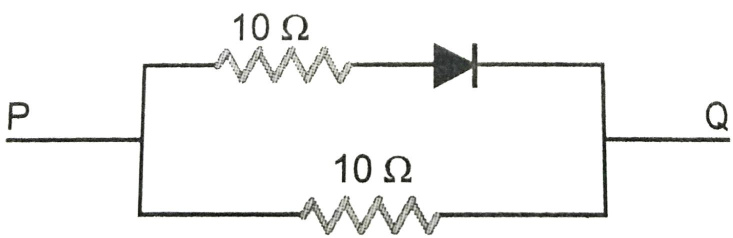
325. Explain that energy of a hole farther from the top of a valence band is high.

Watch Video Solution

326. The ionisation energy of isolated pentavalent phosphorous atom is very large. How is it possible that when it goes into silicon lattice position to ralease its fifth electron at room temperature so that n-type semiconductor is obtained?

Watch Video Solution

327. Find the equivalent resistance of the network shown in Fig.1 between the point p and Q, when the p-n junction diode used ideal one.



Watch Video Solution

Watch Video Solution

328. If the emitter and base of n-p-n transistor have same doping concentration, explain how will the collector and base currents be affected?

Watch Video Solution

329. The gain of a common emitter amplifier is given by $A_V = -g_m R_L$. Does it mean that if we keep on increasing indefinitely R_L, the gain of the amplifier will also increase indefinitely? Explain your answer.

Watch Video Solution

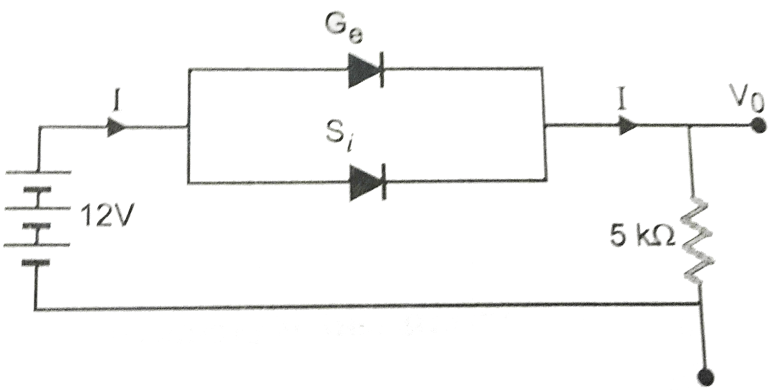
330. How does potential barrier of a semiconductor vary with temperature?

Watch Video Solution

331. What will be the probability of electrons to be found in the conduction band of an intrinsic conductor at a finite temperature with increasing band gap?

Watch Video Solution

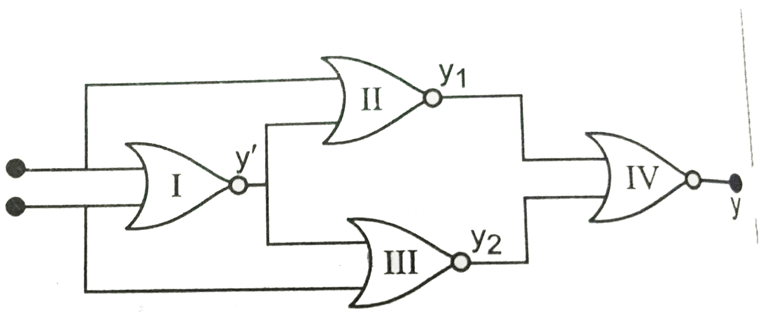
332. Calculate the value of output voltage V_0 and I if the Si diode and the Ge diode conduct at 0.7 V and 0.3V respectively, in the circuit given in Fig. If now Ge diode connections are reversed, what will be the new values of V_0



and I.

Watch Video Solution

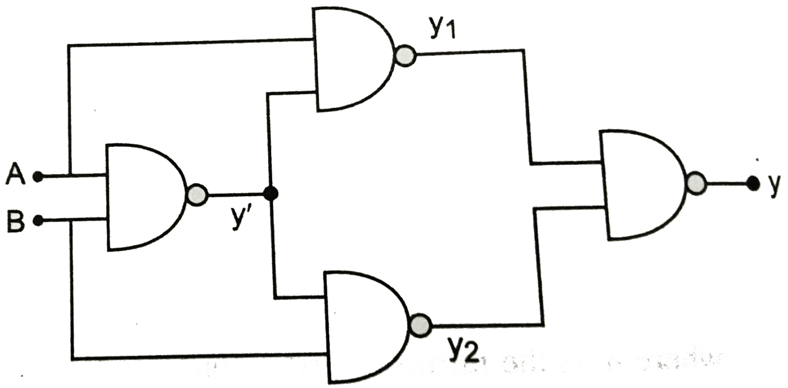
333. Produce the truth table of the combination of four NOR gates arranged as shown in Fig.



Watch Video Solution

334. Prove that

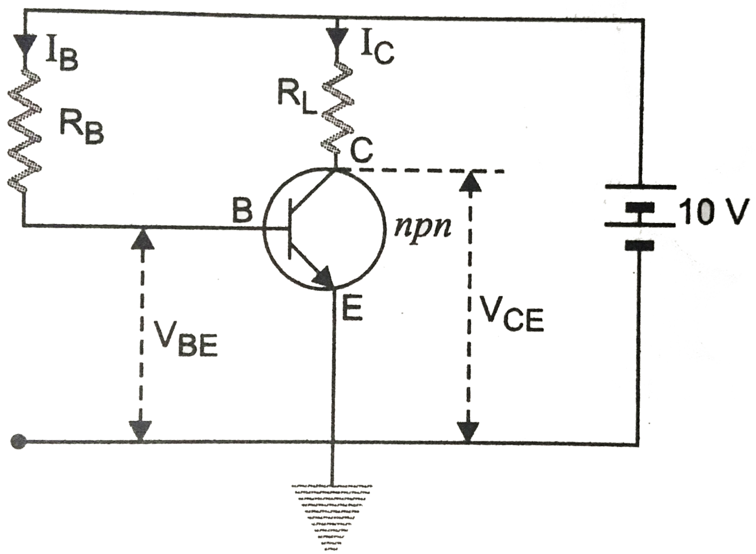
$$(\overline{A.B}).(A+B)=A.\overline{B}+\overline{A}.B$$



Watch Video Solution

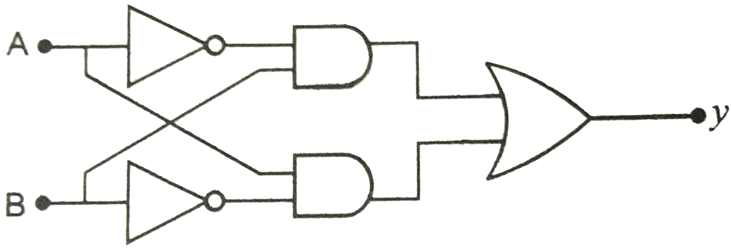
335. A npn transistor in a common emitter mode is used as a simple voltage amplifier with a collector current of $5mA$. The terminal of $10V$ battery is connected to a collector through a load resistance R_L and to the base through a resistance

R . The collector emitter voltage $V_{CE} = 5V$, base emitter voltage, $V_{BE} = 0.5V$ and base current amplification factor $\beta_{d.c.} = 100$. Calculate the value of R_L and R .



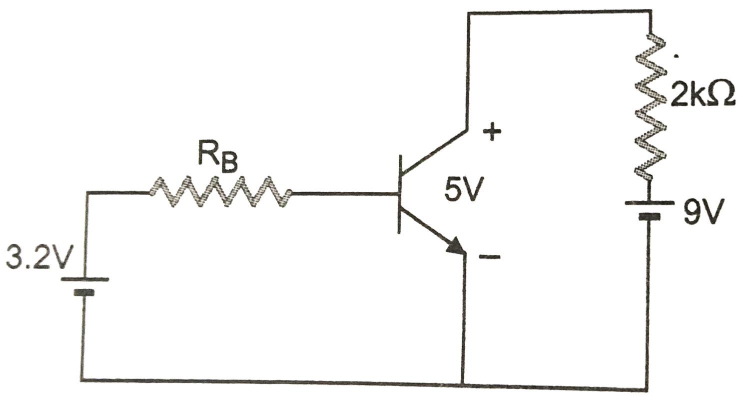
Watch Video Solution

336. Find the Boolean expression of the output y in terms of the input A and B for the circuit shown in Fig.Name the gate formed.



Watch Video Solution

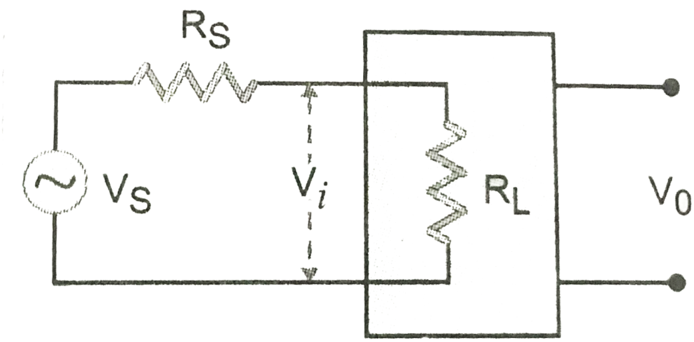
337. In which region transistor with $h_{fe} = 80$ operates as shown in Fig. Also find R_B.



Watch Video Solution

Watch Video Solution

338. An amplifier is represented by the circuit shown in Fig. Here r_i is the input resistance of the amplifier and the voltage V_i is appearing across it. This voltage is amplified by a factor A_V and appears across the load as voltage V_0



An external voltage V_s is applied at the input terminals of the amplifier via series resistance R_S. What will be the apparent gain $A_V(=V_0/V_s)$ of the ampilifier in terms of A_V, R_S and r_i.

Watch Video Solution

339. A pure semiconductor germanium or silicon, free of every impurity is called intrinsic semiconductor. A room temperature, a pure semiconductor has a very small number of current carriers (electrons and holes). Hence, its conductivity is low.

When the impurity atoms of valence five or three are doped in a pure semiconductor, we get repectively n-type ot p-type extrinsic semiconductor. In case of a doped semiconductor.

$n_e n_h = n_i^2,$

where n_e and n_h are the number density of electrons and holes respectively and n_i is the number density of intrinsic charge carriers in a pure semiconductor. The conductivity of extrinsic semiconductor is much higher than that of intrinsic semiconductor.

(i) Name two materials to be doped in pure semiconductor of silicon to get p-type semiconductor n-type semiconductor.

(ii) What do you learn from the above study?

Watch Video Solution

340. p-n junction is a semiconductor diode. It is obtained by bringing p-type semiconductor inclose contact with n-type semiconductor. A thin layer is developed at the p-n junction which is devoid of any charge carrier but has immobile ions. It is called depletion layer. At the junction a potential barrier appears, which does not allow the movement of majority charge carriers across the junction in the absence of any biasing of the junction.

p-n junction offer low resistance when forward biased and high resistance when reverse biased. Read the above paragaph and answer the following question:

(i) Can we measure the potential barrier of p-n junction by putting a sensitive voltmeter across its terminals?

(ii) What practical lesson do you draw from the above study?

Watch Video Solution

341. 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?

Watch Video Solution

342. Rohan was studying in a science college and was staying with his grand father. One day, the old torch which was being used by Rohan's grand father stopped wirking. He asked Rohan to purchase a new torch for him. Rohan himself made a torch using LED with a small recharge battery and gave it to his grand father as a gift. Rohan explained the advantages of LED over a bulb. Rohan's grand father was very happly.

Read the above passage and answer the following question:

(i) What is LED ? Name the two materials used in making LED, whose light falls in the visible region.

(ii) Why LED is a better choice than a bulb in torch?

(iii) What do you think about the attitude of Rohan towards his grand father?

Watch Video Solution

343. Manoj wanted to do social work work during vacations. He visited a remote village where there was no electricity. He made up his mind to help the villagers for getting the solar panels. For this he educated the villagers about the technology and uses of solar panels. He requested the villagers to apply for the same to the government as the same was given to the villagers on subsidised rates. Villagers agreed and applied for the solar panels. They got the same from government at reduced price. When the solar panels started working, the villagers were very happy.

Read the above passage and answer the following question:

(i) What is solar panel?

(ii) What is the basic principle of working of a solar cell?

What are the basic values you assess in manoj?

Watch Video Solution

344. Meeta father was driving her to the school. At the traffice signal she noticed that each traffic light was made of many tiny lights instead of a signal bulb. When Meeta asked this question to her father's he explained the reason for this.

Answer the following question based on above information:

(i) What were the values displayed by Meeta and her father?

(ii) What answer did Meeta's father give?

(iii) What are the tiny light in traffice signal called and how do these operate?

Watch Video Solution

SAMPLE PROBLEM

1. The V-I characteristics of silicon diode is shown in Fig. Calculate the diode resistance in forward bias at $V = +0.9V$ reverse bias $V = -3.0V$.

View Text Solution

2. From the output characteristic shown in fig. calculate the value of current amplification factor of the transistor when $V_{CE} = 2V$.

View Text Solution

CONCEPTUAL PROBLEMS

1. In a radio receiver, the short wave and medium wave station are tuned by using the same capacitor but coils of different inductance L_s and L_m respectively then

Watch Video Solution

SHORT QUESTION ANSWER

1. What do you understand by the cut off, active and saturation states of the transistor? In which of these state does the transistor not remain when being used as a switch?

View Text Solution

EXERCISES (NCERT)

1. In a $p-n$ junction diode, the currect I can expressed as $I = I_0 \exp\left(\frac{eV}{2k_B T} - 1\right)$ where I_0 is called the reverse saturation current, V is the voltage across the diode and is positive for forward bias and negative for reverse bias, and I is the current through the diode, K_B is the Boltzmann constant $\left(8.6 \times 10^{-5} eV/K\right)$ and T is the absolute temperature. If for a given diode $I_o = 5 \times 10^{-12} A$ and $T = 300K$, then

(a) What will be the forward current at a formward voltage of $0.6V$?

(b) What will be the increase in the current if the voltage across the diode is increased to $0.7V$?

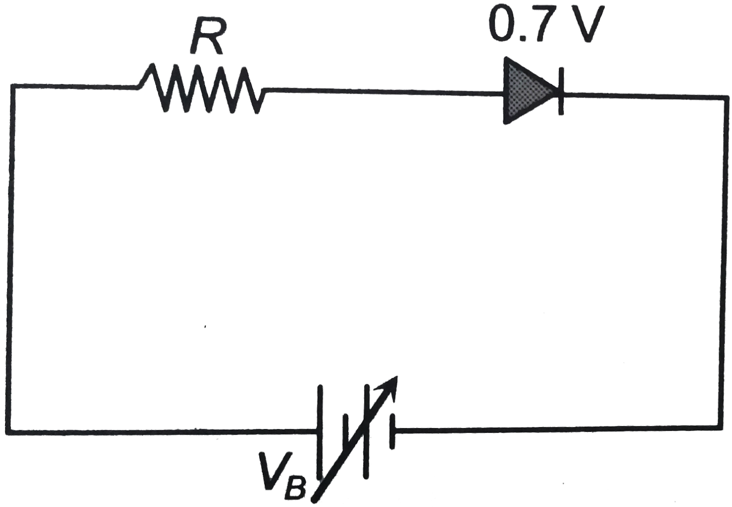
(c) What is the dynamic resistance ?

(d) What will be current if reverse bias voltage changes from $1V$ to $2V$?

Watch Video Solution

ADVANCED PROBLEMS FOR COMPETITIONS

1. The junction diode in the following circuit requires a minimum current of $1mA$ to be above the knee point $(0.7V)$ of its $I-V$ characterstic curve. The voltage across the diode is independent of current above the knee point. If $V_B = 5V$, then the maximum value of R so that the voltage is above the knee point, will be



Watch Video Solution

2. In a $p-n$ junction diode, the currect I can expressed as $I = I_0 \exp\left(\frac{eV}{2k_BT} - 1\right)$ where I_0 is called the reverse saturation current, V is the voltage across the diode and is positive for forward bias and negative for reverse bias, and I is the current through the diode, K_B is the Boltzmann constant $(8.6 \times 10^{-5} eV / K)$ and T is the absolute temperature. If for a given diode $I_o = 5 \times 10^{-12} A$ and $T = 300K$, then

(a) What will be the forward current at a formward voltage of $0.6V$?

(b) What will be the increase in the current if the voltage across the diode is increased to $0.7V$?

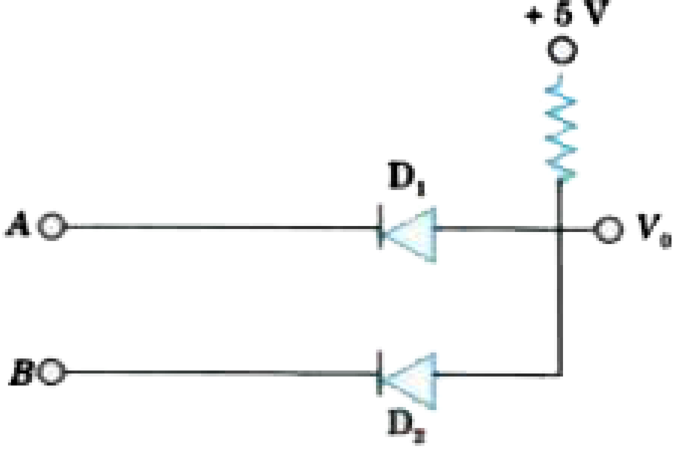
(c) What is the dynamic resistance ?

(d) What will be current if reverse bias voltage changes from $1V$ to $2V$?

Watch Video Solution

VERY SHORT QUESTION ANSWER (NCERT)

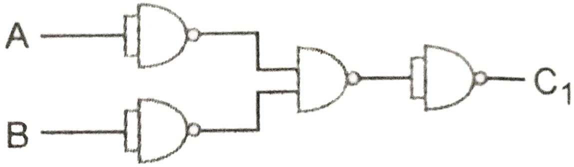
1. Write the truth table for the circuit shown in name the gate that the circuit resembles



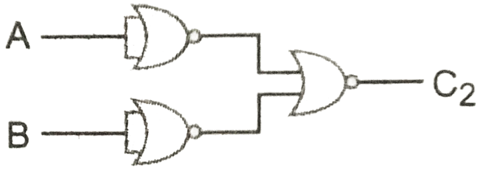
Watch Video Solution

LONG QUESTION ANSWER (NCERT)

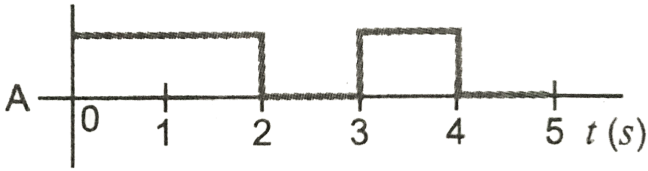
1. Draw the output signal C_1 and C_2 in the given combination of gates (Fig.)



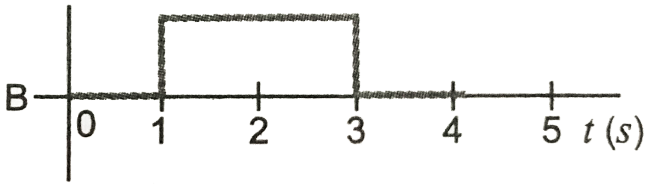
a



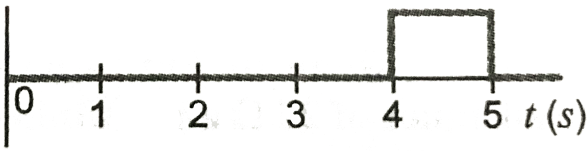
b



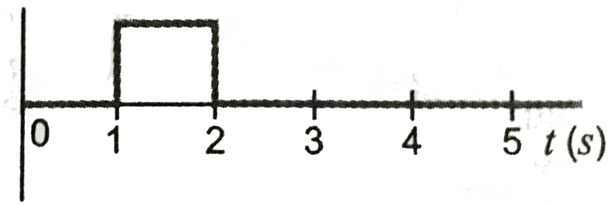
c



d

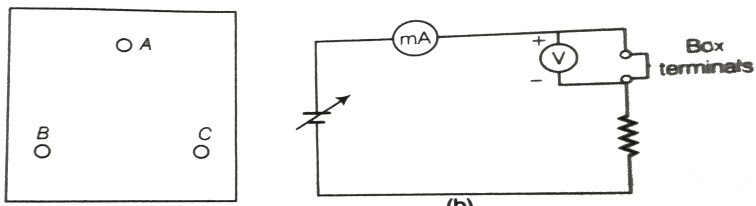


e



f

2. Consider a box with three terminals on top of it as shown in figure.



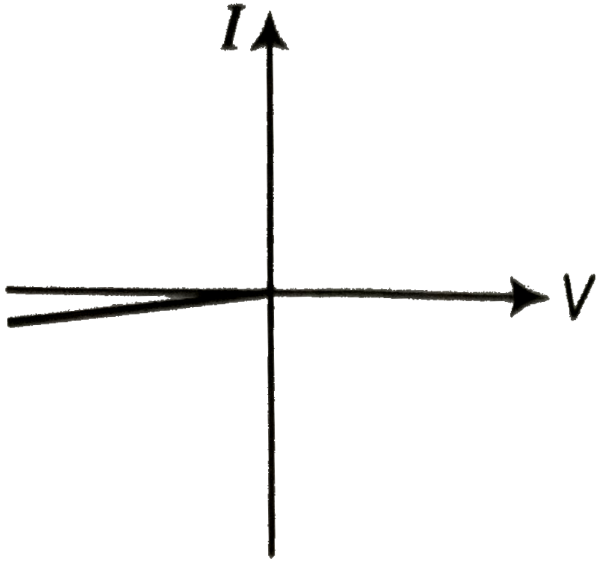
(a) (b)

Three components namely, two germanium diodes and one resistor are connected across these three terminals in some arrangement

A student performs an experiment in which any two of these three terminals are connected in the circuit shown in figure.

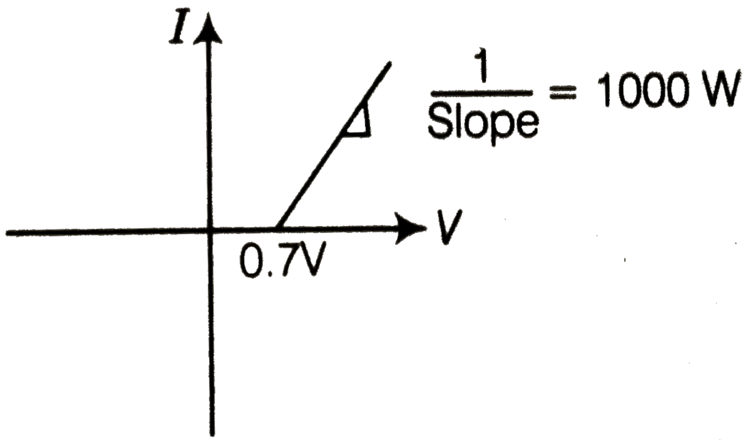
The student obtains graphs of current-voltage characteristics for unknown combination of components between the two terminals connected in the circuit. The graphs are

(i) When A is positive and B is negative



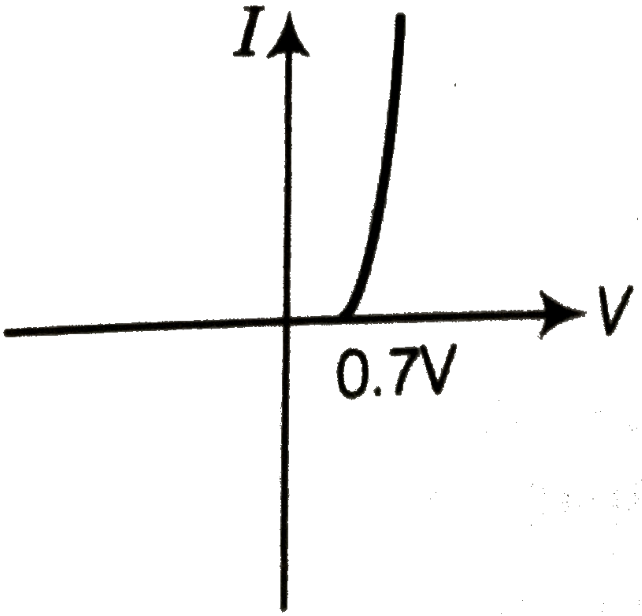
(c)

(ii) When A is negative and B is positive



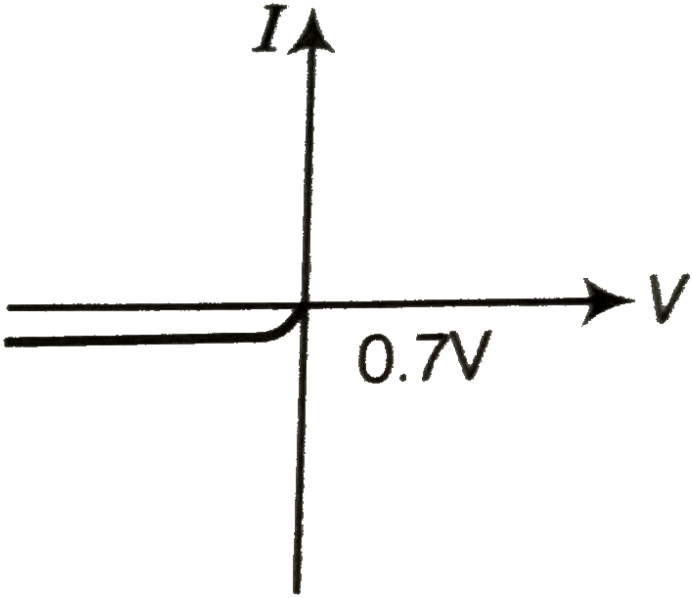
(d)

(iii) When B is negative and C is positve



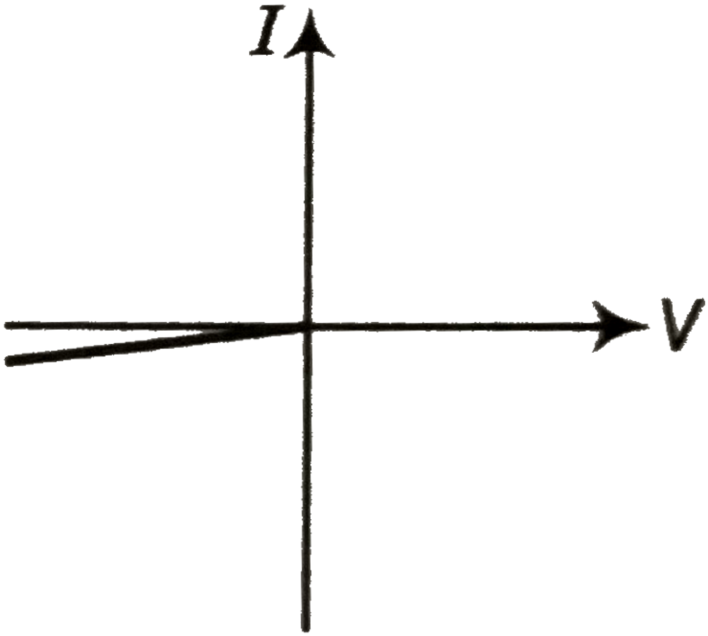
(e)

(iv) When B is positive and C is neagtive



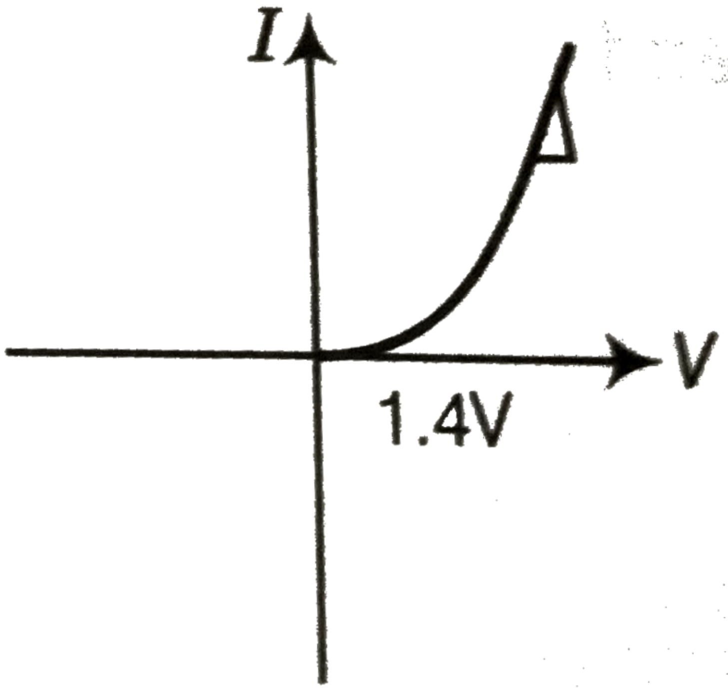
(f)

(v) When A is positive and C is negative



(g)

(vi) When A is negative and C is positive



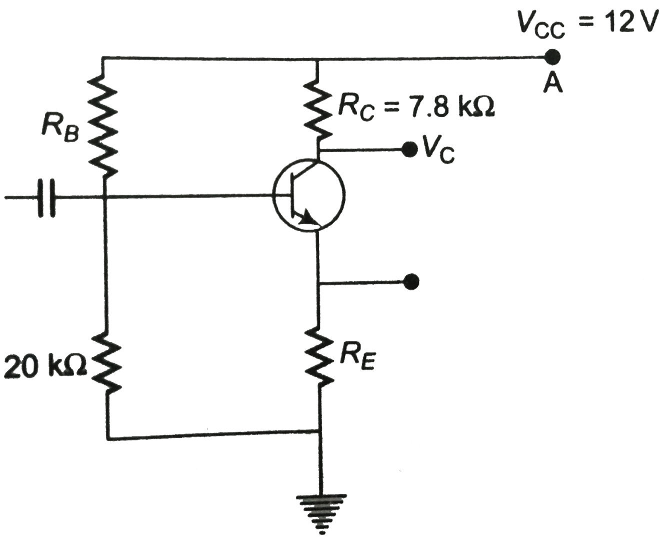
(h)

From these graphs of current – voltage characteristic shown in fig. (c) to (h) determine the arrangement of components between A, B and C.

Watch Video Solution

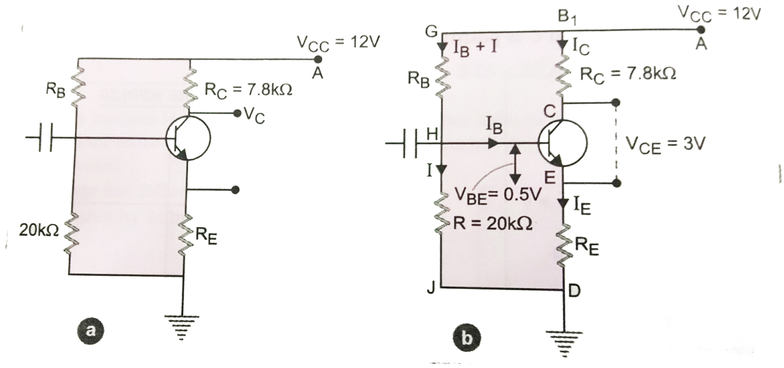
3. For the transistor circuit shown in figure , evaluate V_E, R_B and R_E. Given $I_C = 1mA$,

$V_{CE} = 3V$, $V_{BE} = 0.5V$, $V_{\mathbb{C}} = 12V$ and $\beta = 1000$



Watch Video Solution

4. In the circuit shown in Fig., find the value of R .



View Text Solution

HIGHER ORDER THINKING SKILLS

1. Produce the truth table of the combination of four NAND gates arranged as shown in Fig.Name the gate so formed.

View Text Solution

Exercise

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

Watch Video Solution

2. What are the Instrinsic semiconductor ? Explain how do they work?

Watch Video Solution

3. What do you understand by term 'holes' in a semiconductor? Discuss how they move under the influence of an electric field?

Watch Video Solution

4. Discuss electrical conduction in semiconductors.

Watch Video Solution

5. What is doping ? State the methods of doping.

Watch Video Solution

6. How is an n-type semiconductor formed? Name the majority charge carriers in it. Draw the energy band diagram of n-type semiconductor.

Watch Video Solution

7. Draw the energy band diagram of a p-type semiconductor. Deduce an expression for the conductivity of a p-type semiconductor.

Watch Video Solution

8. EFFECT OF TEMPERATURE ON THE MOBILITY AND CONDUCTIVITY OF ELECTRONS AND HOLES

Watch Video Solution

9. What do you understand by electrical conductivity of a semiconductor? Find a relation for the same.

Watch Video Solution

10. What is p-n junction? How is a p-n junction made? How potential barrier is caused in it.

Watch Video Solution

11. 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

12. Explain with the help of a diagram, how depletion region and potential barrier are formed in a junction diode.

If a small voltage is applied to a p-n junction diode how will the barrier potential be affected when it is (i) forward biased and (ii) reverse biased?

Watch Video Solution

13. Using the necessary circuit diagram, show how the V-I characteristics of a p-n junction are obtained in (i) forward biasing (ii) Reverse biasing. How are these characteristics made use of in rectification?

Watch Video Solution

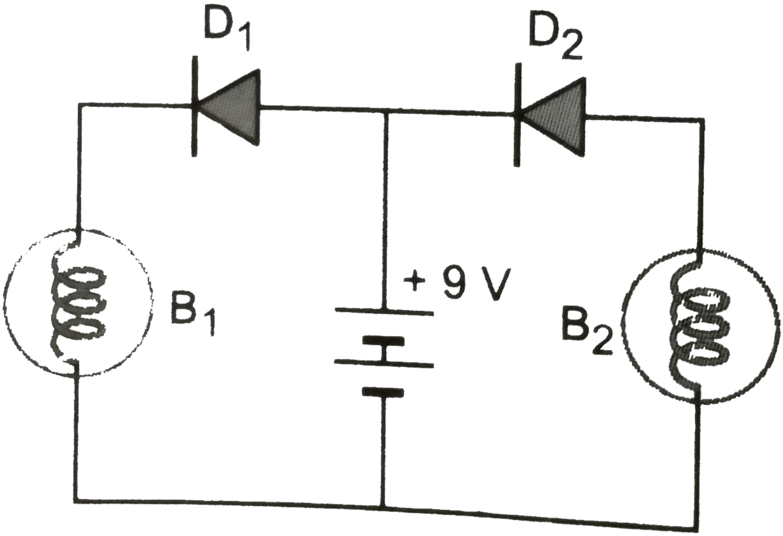
14. Explain briefly with the help of necessary diagram, the forward and the reverse biasing of p-n junction diode. Also draw their characteristic curves in the two cases.

Watch Video Solution

15. 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

16. In the following diagram, which bulb out of B_1 and B_2 will glow and why?

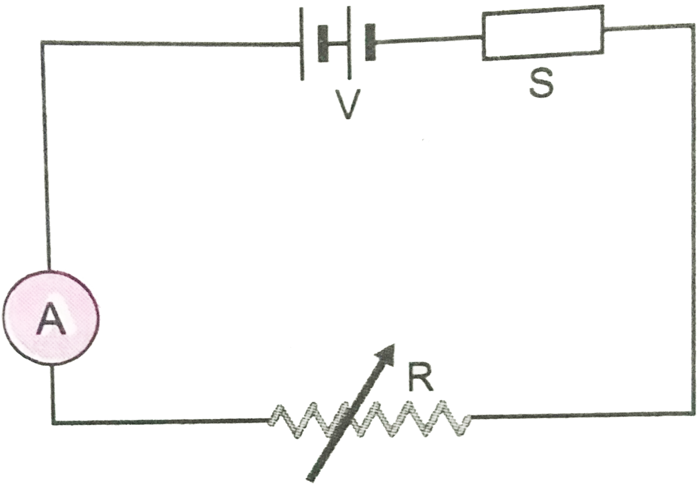


Draw a diagram of an illuminated p-n junction solar cell

Explain briefly the three processes due to which generation of emf takes place in a solar cell.

Watch Video Solution

17. The diagram Fig.12 shown a piece of pure semiconductor S in series with a variable resistor R, and a source of constant voltage V. Would you increase or decrease the value of R to keep the reading of ammeter constant, when semi-conductor S is heated? Give reason.



Watch Video Solution

18. Draw the circuit diagram of an illuminated photodiode in reverse bias? How is photodiode used to measure light intensity?

Watch Video Solution

19. What is light emitting diode (LED) ? Mention two important advantages of LEDs over con-ventional lamps.

Watch Video Solution

20. Mention the important considerations required while fabricating a p-n junction diode to be used as light emitting diode (LED). What should be the order of the band gap of an LED if it is required to emit light in the visible region.

Watch Video Solution

21. Give reasons for the following:

(i) High reverse voltage do not appear across a LED. (ii) Sunlight is always required for the working of a solar cell.

(iii) The electric field, of the junction of a ener diode, is very high even for a small reverse bias voltage of about 5V.

Watch Video Solution

22. Write the function of three segments of a transistor.

Watch Video Solution

23. Sketch the three modes of study of n-p-n junction transistor.

Watch Video Solution

24. Explain that a transistor can be used as a switch.

Watch Video Solution

25. Discuss briefly the concept of an amplifier.

Watch Video Solution

26. 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

27. Explain the advantages and disadvantages of semiconducting devices compared to vacuum tube.

Watch Video Solution

28. Give the logic symbol, truth table and Boolean expression for OR gate. How is it realised in practice?

Watch Video Solution

29. Give the logic symbol, truth table and Boolean expression for AND gate? How is it obtained in practice?

Watch Video Solution

30. How is NOT gate realised? Explain.

Watch Video Solution

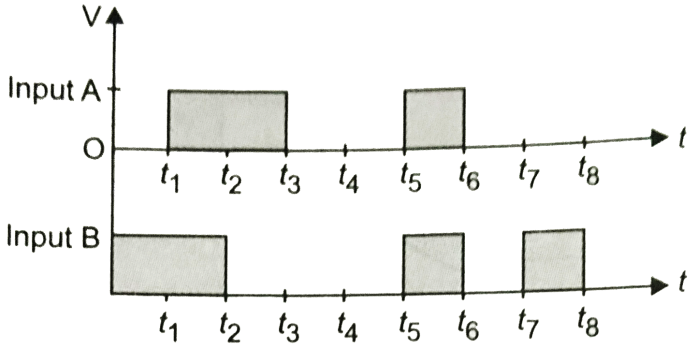
31. What is logic gate? Distinguish between AND and OR gates.

Watch Video Solution

32. What are main logic gates? How many types are they? Draw their symbols and truth tables.

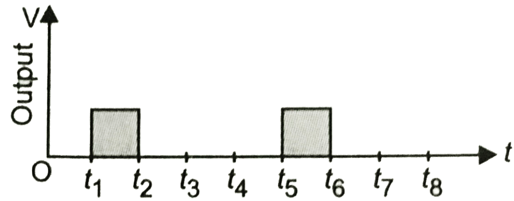
Watch Video Solution

33. Two signals A, B as given below are applied to (i) AND (ii) NOR and (iii) NAND gates. Draw the output wave form in each case.



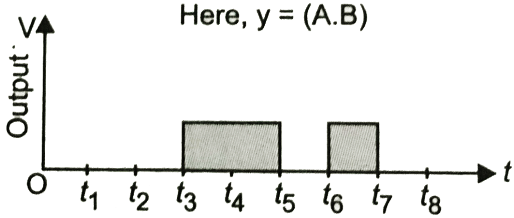
Ans.

(i)



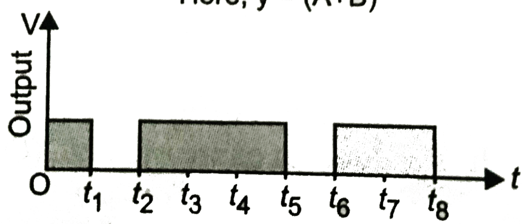
Here, $y = (A.B)$

(ii)



Here, $y = (\overline{A+B})$

(iii)



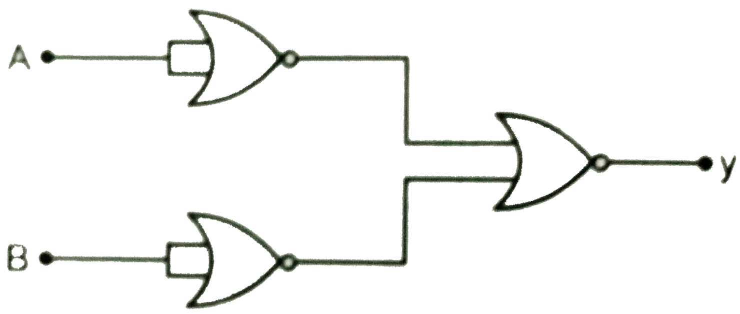
Here, $y = (\overline{A.B})$

Watch Video Solution

34. Give the logic symbol, Boolean expression and truth table of NAND gate.

Watch Video Solution

35. Identify the logic gate equivalent to the circuit shown in the Fig.Draw the truth table for all possible values of inputs A and B.



Watch Video Solution

36. Discuss an integrated circuit. Explain the meaning of SSI, MSI, LSI and VLSI.

Watch Video Solution

37. What is integrated circuit ? Discuss the advantages of integrated circuit over conventional electronic circuit.

Watch Video Solution

38. Explain formation of energy band in solids. Distinguish between conductors, extrinsic and intrinsic semi-conductors and insulators on the basis of band theory.

Watch Video Solution

39. Draw the "energy bands" diagram for a (i) pure semiconductor (ii) insulator. How does the energy band, foe a pure semiconductor, get affected when this semiconductor is doped with an acceptor impurity donor impurity? Hence discuss why the 'holes' and the 'electrons' respectively, become the 'majority charge carriers' in these two cases.

Watch Video Solution

40. What is an extrinsic semiconductor? Discuss the working of the various types of extrinsic semiconductors with help of their energy band diagram.

Watch Video Solution

41. Distinguish between (i) Intrinsic and Extrinsic semiconductor and

(ii) n-type semiconductor and p-type semi-conductor.

Watch Video Solution

42. Distinguish between n-type and p-type semiconductors on the basis of energy-band diagrams. Explain the process of conduction in both type of materials.

Watch Video Solution

43. 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

44. 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

45. What is a p-n junction diode? Define the term 'dynamic resistance' for the junction diode. With the help of a circuit diagram explain the working of a p-n junction diode as a full wave rectifier.

Watch Video Solution

46. What do you understand by decimal number system and binary number system. Discuss conversion of decimal number system into binary number system with illustrations.

Watch Video Solution

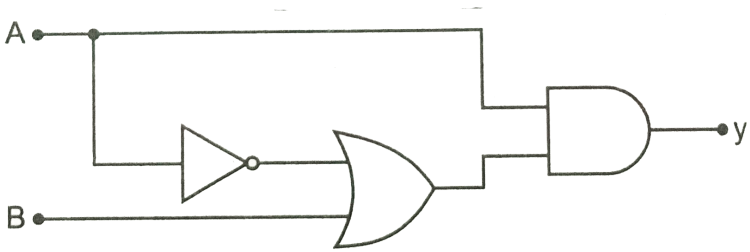
47. What do you understand by logic gate? Why is it so called? State the type of gates.

Watch Video Solution

48. Describe (i) NAND gate, (ii) NOR gate and (iii) XOR gate.

Watch Video Solution

49. Explain how an OR gate may be constructed with AND and NOT gates. A logic circuit is given in the Fig.charge it in simpler form.



[Refer to conceptual Problem 4 for first part. The given figure represents AND gates as $y = A.\left(\overline{A}(A+B)\right) = A.\overline{A} + A.B = A.B$]

Watch Video Solution

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

Watch Video Solution

51. In a pure semiconductor, the number of conduction electrons is 6×10^{19} per cubic metre. Find the total number of current carriers (electrons and holes) in a same semiconductor of size $1cm \times 1cm \times 1mm$.

Watch Video Solution

52. A p-type semiconductor has acceptor energy level 53meV above the valence band. Find the maximum wavelength of light that can creat a hole. Use $h = 6.63 \times 10^{-34} Js, c = 3 \times 10^8 ms^{-1}$.

Watch Video Solution

53. The electrical conductivity of a semiconductor increases when electromagnatic radiation of wavelength shorter than 2480 nm is incident on it. Find the band gap of the semiconductor. Given $h = 6.63 \times 10^{-34} Js, \text{ and } 1eV = 1.6 \times 10^{-19} J$.

Watch Video Solution

54. A doped semiconductor has impurity levels 20 meV below the conduction band. Is the material n-type or p-type? What is the wavelength of light so that the electron of impurity level is just able to jump into conduction band?

Use $h = 6.63 \times 10^{-34} Js, c = 3 \times 10^8 m/s.$

Watch Video Solution

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

Watch Video Solution

56. Find the number density of impurity atoms that must be added to a pure silicon crystal inorder to convert it to have resistivity (i) $10^{-1}\Omega m$ n-type silicon (ii) $10^{-1}\Omega m$ p-type silicon. Give for silicon: $\mu_e = 0.135m^2V^{-1}s^{-1}$ and $\mu_h = 0.048m^2V^{-1}s^{-1}$.

Watch Video Solution

57. Determine the number density of donor atoms which have to be added to an intrinsic germanium semiconductor to produce an n-type semiconductor of conductivity $5\Omega^{-1}cm^{-1}$, given that the mobility of electron in n-type germanium is $3900cm^2V^{-1}s^{-1}$. Neglect the contribution of holes to conductivity.

Watch Video Solution

58. On doping germanium with donor atoms of density $10^{17}cm^{-3}$, find its conductivity if mobility of electrons is $3800cm^2/V-s$ and intrinsic carrier concentration is $2.5 \times 10^{13}cm^{-3}$. Also find the ratio of conductivity of doped germanium and pure germanium.

Watch Video Solution

59. 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 $k = 8.62 \times 10^{-5}eV/K, h = 6.63 \times 10^{-34}Js.$

Watch Video Solution

60. Calculate the number of states per cubic metre of sodium in 3s band. The density of sodium is $1013kgm^{-3}$.How naby of them are empty?

Watch Video Solution

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

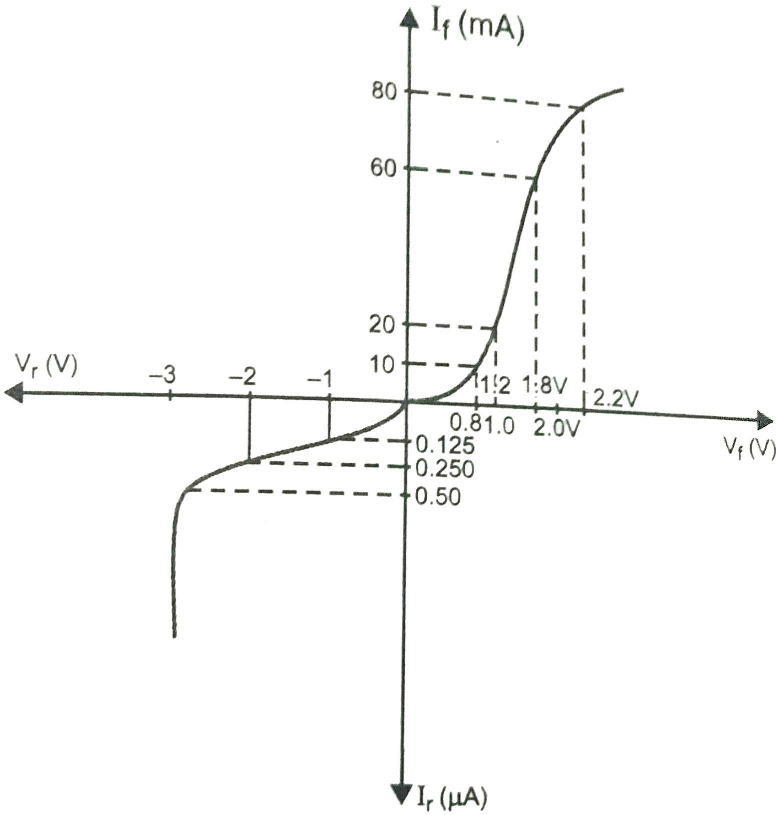
respectively. The heat energy generated in the plate in 100 second is.

Watch Video Solution

62. If resistivity of pure silicon is $3000\Omega meter$, and the electron and hole mobilities are $0.12m^2V^{-1}s^{-1}$ and $0.045m^2V^{-1}s^{-1}$ respectively, determine the resistivity of a specimen of the material when 10^{19} atoms of phosphorous are added per m^3 are also added. Given charge on electron $= 1.6x10^{-19}C$.

Watch Video Solution

63. The V-I characteristics of a silicon diode is given in Fig .Calculate the diode resistance in



forward bias at $V = +2V$ and $V = +1V$ and reverse bias $V = -1V$ and $V = -2V$.

Watch Video Solution

64. A p-n junction is fabricated from a semiconductor with band gap of $3.0eV$. Can it detect a wavelength of (i) $600nm$ (ii)$400nm$?

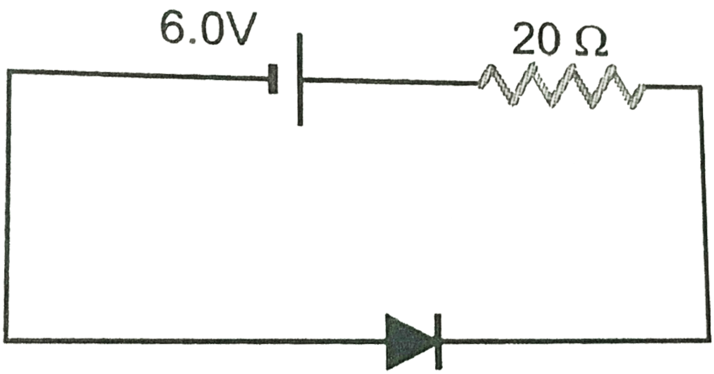
Given, $h = 6.6 \times 10^{-34} Js$.

Watch Video Solution

65. The width of depletion region in a P-N junction diode is 500 nm and an intense electric field of $5 \times 10^5 Vm^{-1}$ is also found to exit init. Determine the height of the potential barrier. Also calculate the kinetic energy which a conduction electron must have inorder to diffuse from the n-side to p-side.

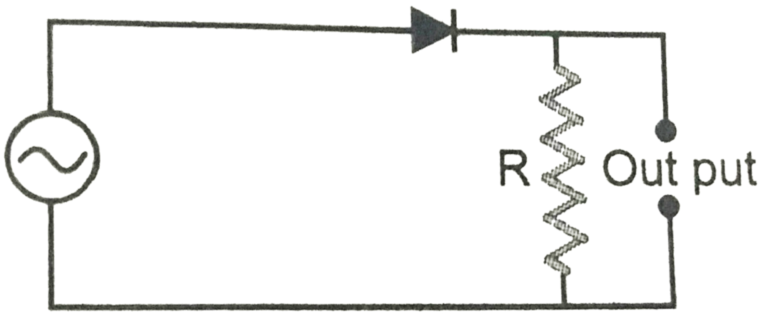
Watch Video Solution

66. Calculate the current through the circuit and the potential difference across the diode shown in Fig. The drift current for the diode is $30\mu A$.



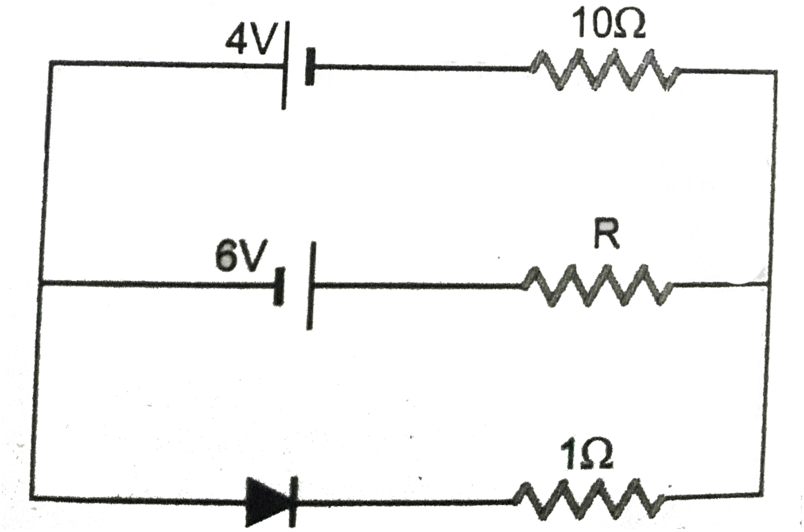
Watch Video Solution

67. A sinusoidal voltage of rms value 200 volt is connected to a diode and a resistor R in the circuit as shown in Fig., so that half wave rectification occurs. If the diode is ideal, what is the rms voltage across R? If resistor R is replaced by capactior of capacitance C, find the potential difference across C.



Watch Video Solution

68. Find the current through the resistance R in Fig if $R = 10\Omega$ and $R = 20\Omega$.

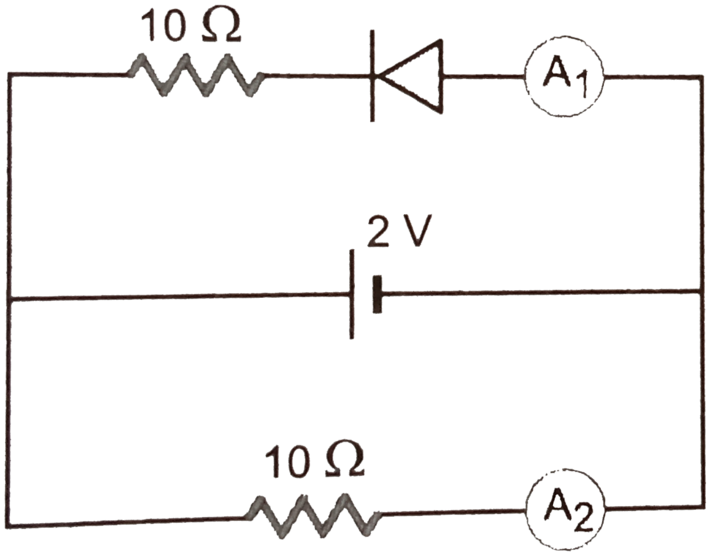


Watch Video Solution

69. A silicon p-n junction diode whose knee voltage is $0.7V$ is connected to a battery with supply voltage $3V$ and $100mA$ in forward biasing. If a resistor R is used in series of the circuit, then a current of 20mA passes through the diode. Find the wattage of the resistor and of the diode.

Watch Video Solution

70. Assuming that the resistance of the meters are negligible, what will be the readings of the ammeters A_1 and A_2 in the circuit shown in Fig.

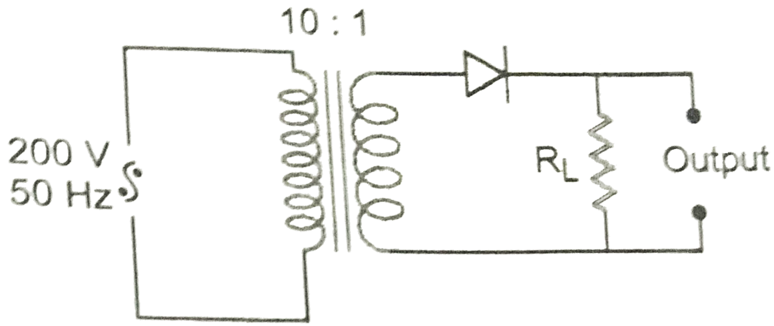


Watch Video Solution

71. The applied input a.c. to a half wave rectifier is 120 watt. The d.c. output is 50 watt. What is the rectification effeciency and power effeciency?

Watch Video Solution

72. Find the average value of d.c. voltage that can be obtained from the half wave rectifier of Fig. assuming that the diode is ideal one.



Watch Video Solution

73. In a photo diode the conductivity increases when the material is exposed to light. It is found that the conductivity changes only if the wavelength of incident light is less than 500 nm. What is the band gap? Use $h = 6.6 \times 10^{-34} Js, c = 3 \times 10^8 ms^{-1}$.

Watch Video Solution

74. In a silicon transistor, a change of $8.0mA$ in the emitter current produces a change of $7.9mA$ in the collector current. What change in the base current is necessary to produce an equivalent change in collector current?

Watch Video Solution

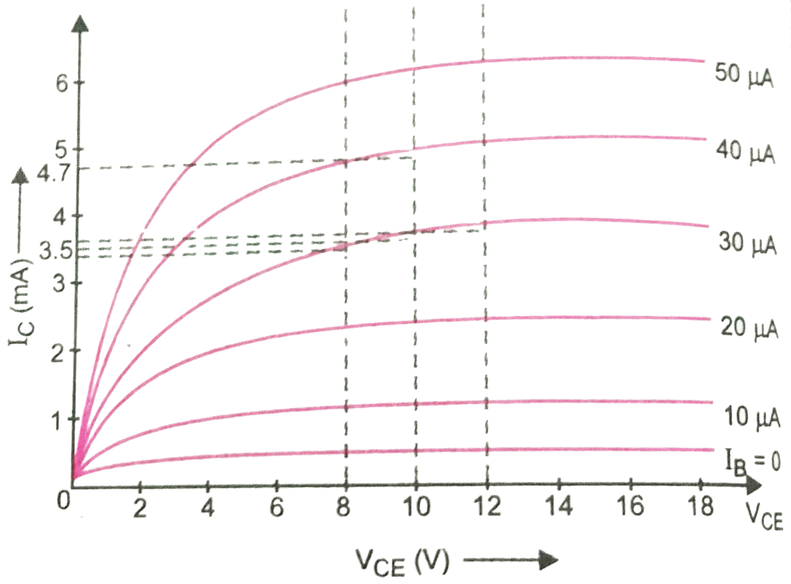
75. The current gain for common emitter amplifier is 69. If the emitter current is $7.0mA$, find (i) base current and (ii) collector current.

Watch Video Solution

76. The potential difference across the collector of a transistor, used in common emitter mode is $1.5V$, with the collector resistance of $3k\Omega$. Find (i) the emitter current and (ii) the base current, if d.c. gain of the transistor is 50.

Watch Video Solution

77. Output characteristics of an n-p-n transistor in CE configuration is shown in the Fig. Determine



(i) dynamic output resistance (ii) dc current gain and (iii) ac current gain at an opererating point $V_{CE} = 10V$, when $I_B = 30\mu A$.

Watch Video Solution

78. The base current of a transistor is 105 muA and collector current is $2.05mA$.

Determine the value of β, I_e and α

A change of $27\mu A$ in the base current produces a change of 0.65 mA in the collector current. Find $\beta_{a.c.}$.

Watch Video Solution

79. In a silicon transistor, base current is changed by $20\mu A$. This result in a change of $0.02V$ in base-emitter voltage and a change of $2mA$ in the collector current.

Find the input resistance, $\beta_{a.c.}$ and transconductance of the transistor.

The transistor is used as an amplifier with the load resistance $5k\Omega$. What is the voltage gain of the amplifier?

Watch Video Solution

80. The input resistance of a silicon transistor is 665Ω. Its base current is changed by $15\mu A$ which result in the change in collector current by $2mA$. This transistor is used as a common emitter amplifier with a load resistance of 5kOmega calculate current gain, $\beta_{a.c.}$, transconductance g_m and voltage gain A_v of the amplifier.

Watch Video Solution

81. 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 and (iv) the value of the output signal.

Watch Video Solution

82. A change of $0.2mA$ in the base current cause a change of $5mA$ in the collector current for a common emitter amplifier. (i) Find the a.c. current gain of the transistor (ii) If the input resistance is $2k\Omega$ and its voltage gain is 75. Calculate the load resistance used in the circuit.

Watch Video Solution

83. A transistor is used in common-emitter mode in an amplifier circuit. It is found that when a signal of $20mV$ is added to the base-emitter voltage, the base current changes by $20\mu A$ and collector current changes by $1.5mA$. Determine the factor beta, input resistance R_i, the transconductance and voltage gain, Given load resistance $R_L = 6k\Omega$.

Watch Video Solution

84. For a common emitter transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 2V. If the current amplification factor of the transistor is 100, calculate (i) input signal voltage (ii) base current and (iii) power gain. Given that the value of the base resistance is $1k\Omega$.

Watch Video Solution

85. A full wave rectifier uses two diodes, the internal resistance of each diode may be assumed constant at 30Ω. The transformer r.m.s. secondary voltage from centre tap to each end of the secondary is 50 V and load resistance is

970Ω. Find (i) the mean load current (ii) the rms value of load current.

Watch Video Solution

86. An a.c. supply if $230V$ is applied to a half wave rectifier circuit through a transformer of turn ratio 10:1. Find the output d.c. voltage. Assume the diode to be ideal.

Watch Video Solution

87. A half wave rectifier is used to supply 50V d.c. to a resistance load of 800Ω. Diode has a resistance of 200Omega. Calculate maximum a.c. voltage required.

Watch Video Solution

88. In a common emitter transistor amplifier, the input resistance of a transistor is 1000Ω. On changing its base current by 10muA, the collector current increases by $2mA$. If a load resistance of $5k\Omega$ is used in the circuit, calculate:

(i) the currnet gain (ii)the voltage gain of the amplifier.

Watch Video Solution

89. A transistor is connected in common emitter configuration. The collector supply is 8V and the voltage drop across a resistor of 800Ω in the collector circuit is 0.5 V. If the current gain factor (α) is 0.96, find the base current.

Watch Video Solution

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

Watch Video Solution

91. In a centre trap full wave rectifier, the load resistance $R_L = 1k\Omega$. Each diode has a forward bias dynamic resistance 20Ω. The voltage across half the secondary winding is 110 sin 100 pit. Find (i) the peak value of current (ii) the dc value of current (iii) the rms value of current.

Watch Video Solution

92. Find the binary number of decimal number 42.

Watch Video Solution

93. Find the decimal number of binary number $(111101.01)_2$

Watch Video Solution

94. Find the binary number of $(23.50)_{10}$.

Watch Video Solution

95. Find the equivalent binary number of decimal number $(9.25)_{10}$.

Watch Video Solution

96. Find the binary (i) addition (ii) subtraction of the following set of numbers , 101010 and 010101.

Watch Video Solution

97. The truth table shown below in and belong to which gates?

(a)

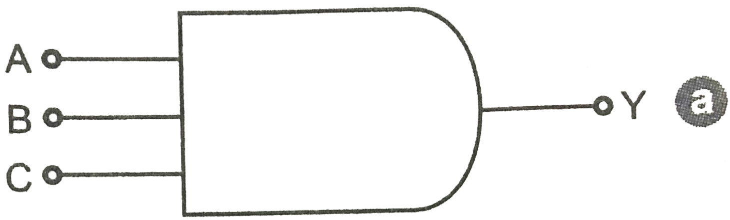
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(b)

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

Watch Video Solution

98. Find the output y of the logic gate whose symbol Is shown in Fig. and give a truth table for the same.

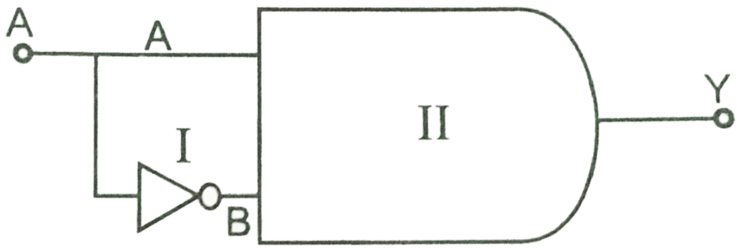


A	B	C	y
0	0	0	0
1	0	0	0
0	1	0	0
0	0	1	0
1	1	0	0
0	1	1	0
1	1	1	1

b

Watch Video Solution

99. Find output y in the folowing circuit Fig.



Watch Video Solution

100. Name the 2-input logic gate, whose truth table is given here, If this logic gate is connected to a NOT gate. What will be the output when

(i) $A = 1, B = 1$ and (ii) $A = 0, B = 1$?

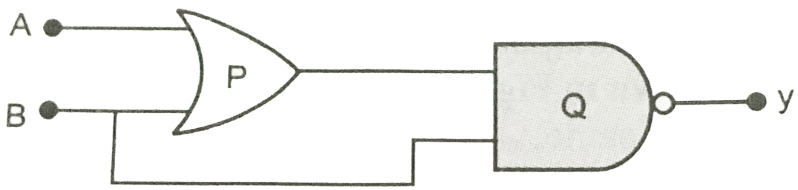
A	B	Output$y$
0	0	1
0	1	1
1	0	1
1	1	0

:

A	B	Out put$y$	Output of Not gate
1	1	0	1
0	1	1	0

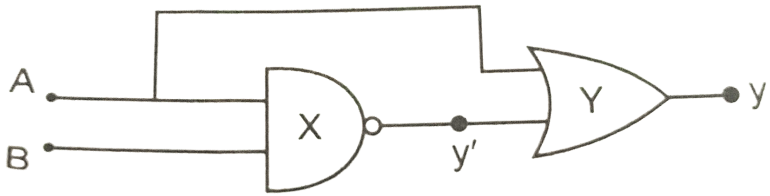
Watch Video Solution

101. Identify the logic gates marked P and Q in the given logic circuit. Write down the Boolean expression for this logic circuit and truth table.



Watch Video Solution

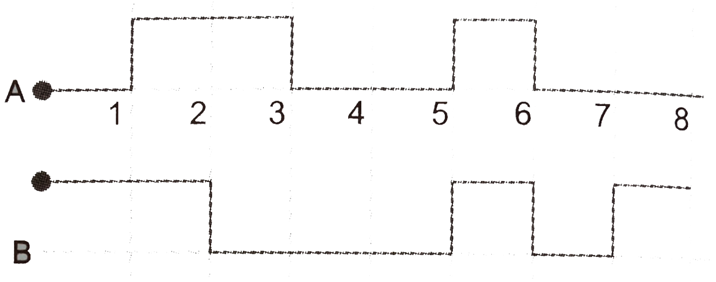
102. Identify the logic gates marked X and Y in Fig.Write down the output at y, when $A = 1, B = 1$ and $A = 0, B = 1$



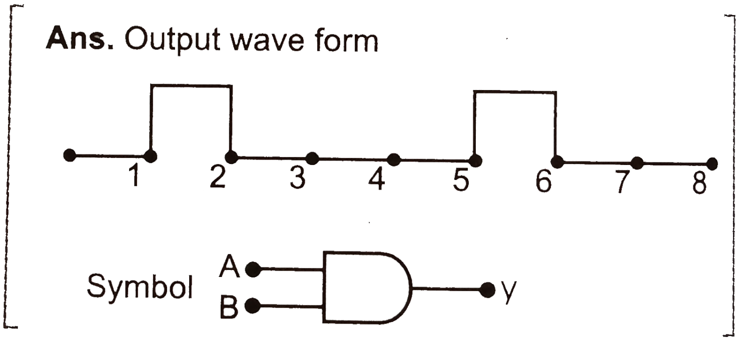
$$\begin{vmatrix} A & B & y' & y \\ 1 & 1 & 0 & 1: \\ 0 & 1 & 1 & 1 \end{vmatrix}$$

Watch Video Solution

103. Two signals A, and B shown in Fig. are used as two inputs of an AND gate obtain its output wave form. Draw the logic symblo of AND gate.



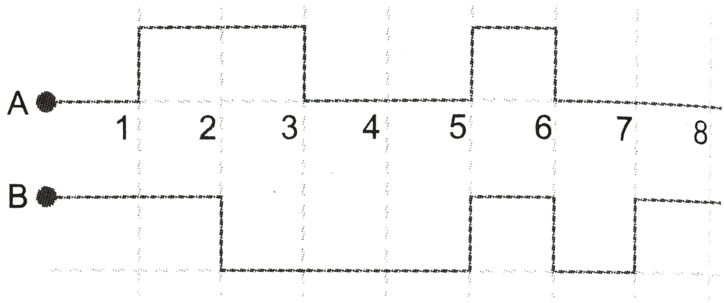
a



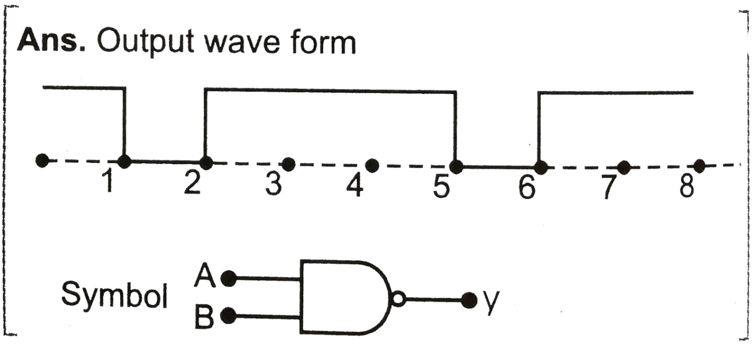
b

Watch Video Solution

104. Two signal A and B shown in the Fig. are used as two inputs of a NAND gate. Draw its output wave form. Give the logic symbol of NAND gate.



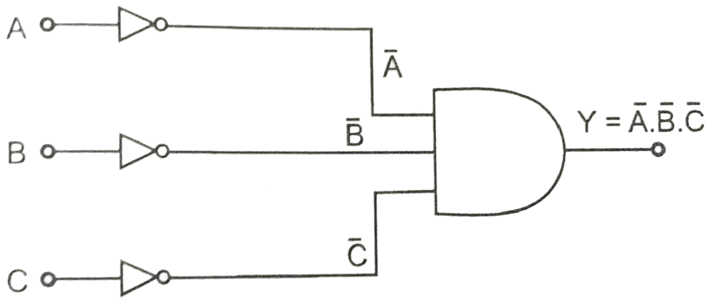
a



b

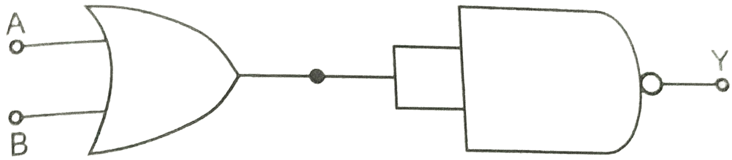
Watch Video Solution

105. Construct a proper combination of 3 NOT and one AND gates in order to get the output of $y = \overline{A}.\overline{B}.\overline{C}$, from three inputs A, B and C.



Watch Video Solution

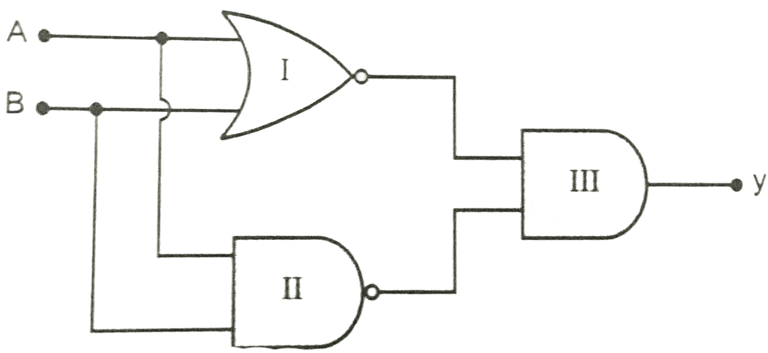
106. Identify the gate represented by the block diagram of Fig. Write its boolean expression, the truth table and name of the gate, it works.



A	B	$A+B$	$\overline{A+B}$
0	0	0	1
1	0	0	1
0	1	1	0
1	1	1	0

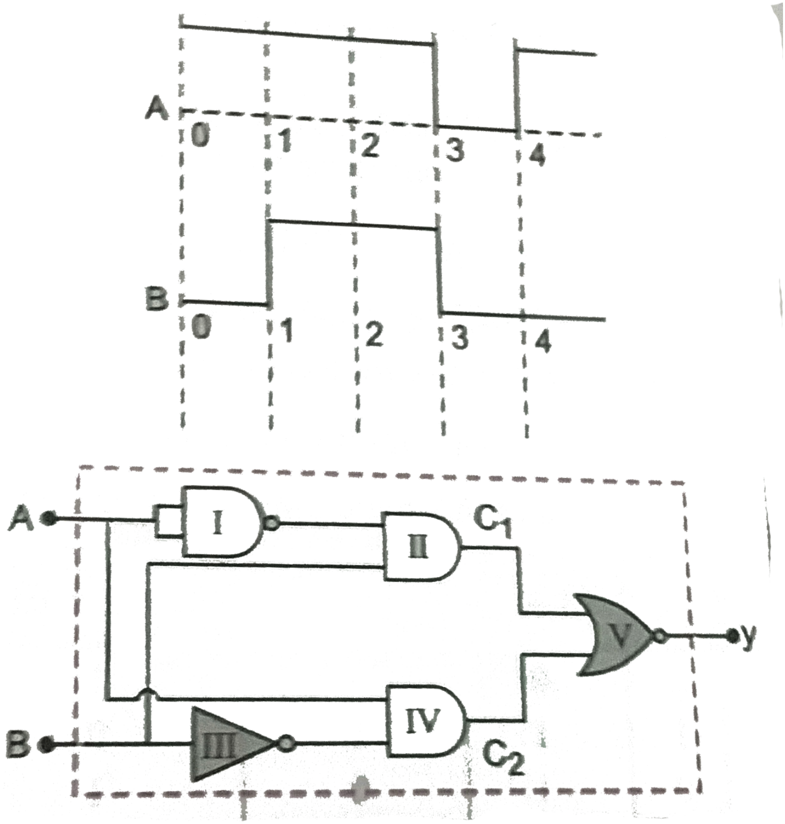
Watch Video Solution

107. Write the truth table for the circuit shown in Fig. Name the gate so formed.



Watch Video Solution

108. Input signal A and B are applied to the input terminals of the 'dotted box' set up shown here. Ley y be the final output signal from the box. What are the wavefroms of the signal labelled as C_1 and C_2 within the box giving (in brief) the reasons for getting these wave forms. Hence draw the waveform of the final output signal y. Give reasons for your choice. Write the relation between the total output y and the input signals A and B?



Watch Video Solution

109. Find the binary numbers of $(32.25)_{10}$ and $(24.25)_{10}$ and give subtraction of the binary numbers obtained.

Watch Video Solution

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

A. number density of free current carriers increases

B. relaxation time increases

C. both number density of carriers and relaxation time increase

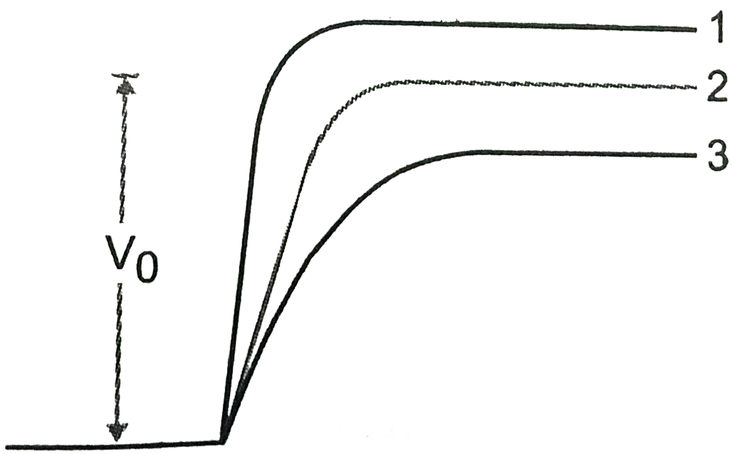
D. number density of current carriers increases, relaxation time decreases but effect of decrease in relaxation time is much less than increase in number density

Answer: D

Watch Video Solution

Watch Video Solution

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



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

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

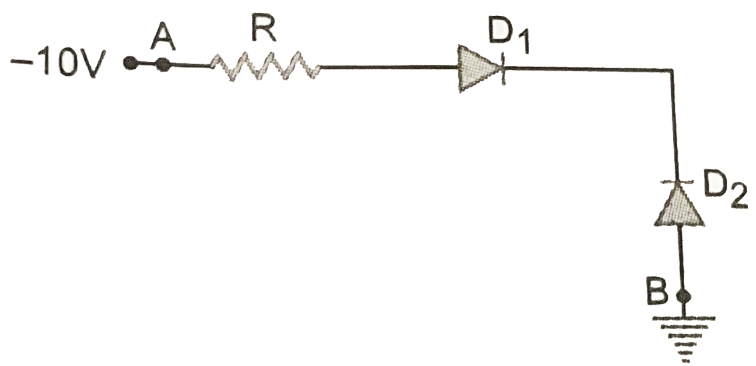
C. 1 corresponds to forward bias and 3 corresponds to reverse bias of junction

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

Answer: B

Watch Video Solution

112. In Fig.assuming the diode to be ideal



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

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

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

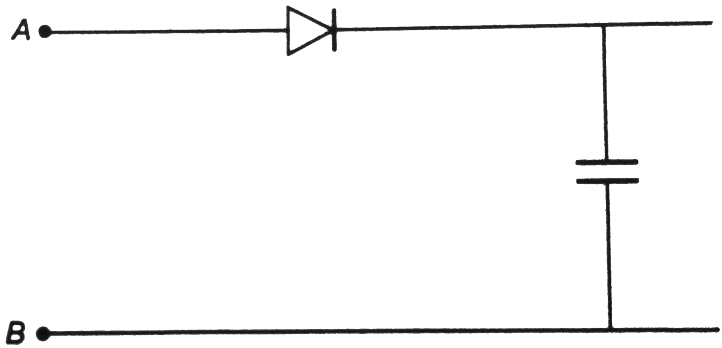
D. D_1 and D_2 are both reverse biased and hence no current flows from A to B and vice versa

Answer: B

Watch Video Solution

113. A 220 V AC supply is connected between points A and B .

What will be the potential difference V across the capacitor ?



A. $220V$

B. $110V$

C. $0V$

D. $220\sqrt{2}V$

Answer: D

Watch Video Solution

114. Hole is

A. an anti-partical of electron

B. a vacancy created when an electron leavels a convalent bond

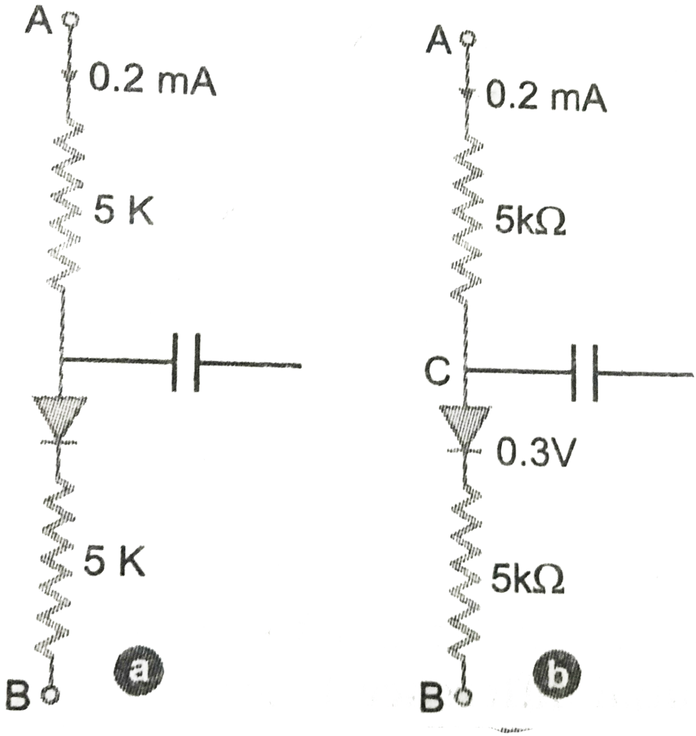
C. absence of free alectrons

D. an artifically created partical

Answer: B

Watch Video Solution

115. The output of the given circuit in Fig.



A. would be zero at all times

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

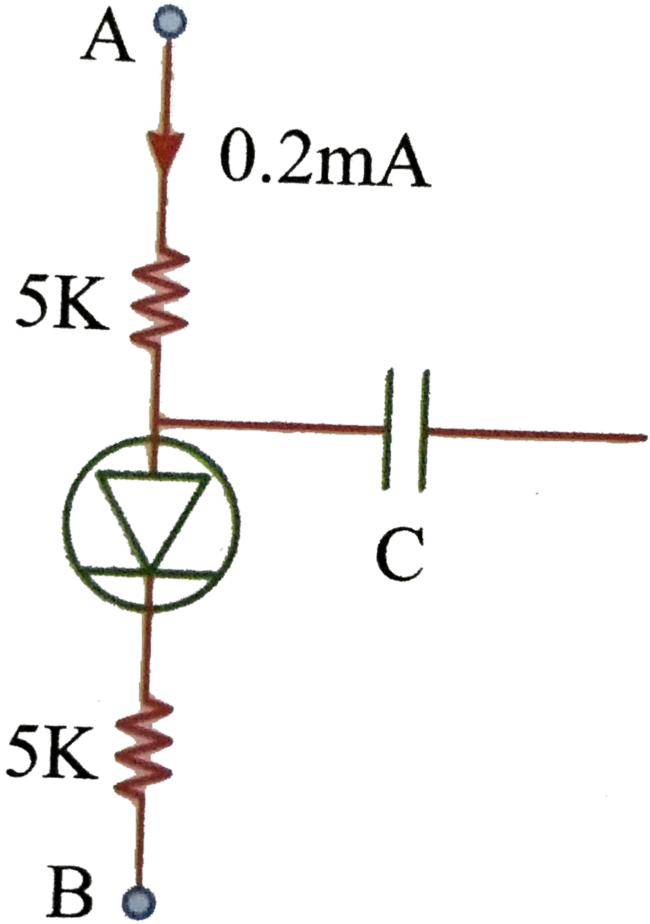
C. would be like a half wave rectifier with negative cycles in output

D. would be like that of a full wave rectifier

Answer: C

Watch Video Solution

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



A. 1.3 V

B. 2.3V

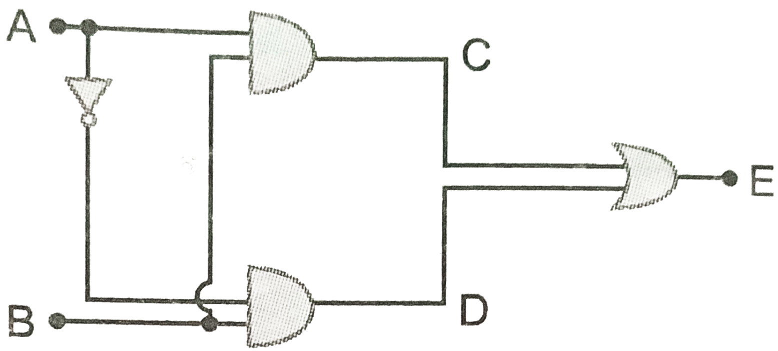
C. 0

D. 0.5V

Answer: B

Watch Video Solution

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



A.

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

B.

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

C. $\begin{vmatrix} A & B & E \\ 0 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix}$:

D. $\begin{vmatrix} A & B & E \\ 0 & 0 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{vmatrix}$:

Answer: C

Watch Video Solution

118. When an electric field is applied across a semiconductor,

A. electrons move from lower energy level to higher energy level in the conduction band

B. electrons move from highter energy level in the conduction band

C. holes in the valence band move from higher energy level to lower energy level

D. holes in the valence band move from lower energy to higher energy level

Answer: A::C

Watch Video Solution

119. Consider an n-p-n transistor with its base - emitter junction forward biased and collector base junction reverse biased . Which of the following statements are true?

A. Electrons crossover from emitter to collector

B. holes move from base to collector

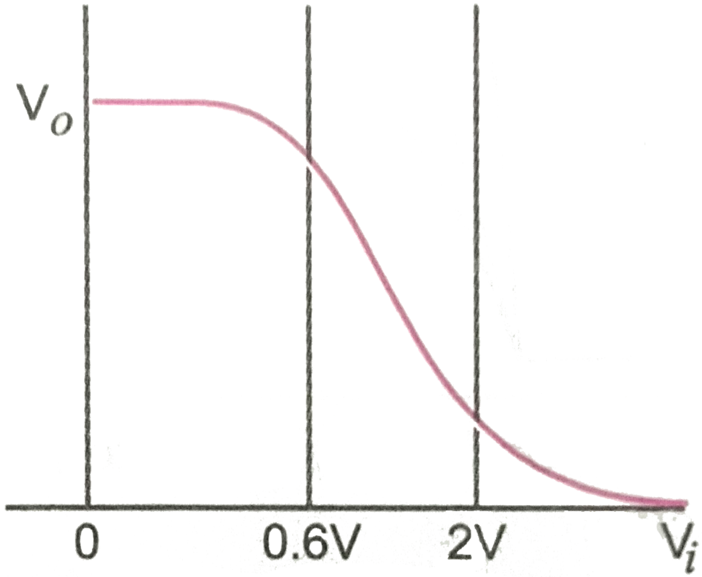
C. Electrons move from emitter to base

D. Electrons from emitter move out of base without going to the collector

Answer: A::C

Watch Video Solution

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



A. At $V_i = 0.4V$, transistor is in active state

B. At $V_i = IV$, it can be used as an amplifier

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

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

Answer: B::C::D

Watch Video Solution

121. In an n-p-n transistor circuit , the collector currents is 10mA . If 95 per cent of the electrons emitted reach the collector, which of the following statements are true?

A. The emitter current will be $8mA$

B. The emitter current will be $10.53mA$

C. The base current will be $0.53mA$

D. The emitter current will be $2mA$

Answer: B::C

Watch Video Solution

122. In the depletion region of a diode.

A. there no mobile charges

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

C. recombination of holes and electrons has taken place

D. immobile charged ions exit

Answer: A::B::D

Watch Video Solution

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

A. The current in and voltage across the Zener remains fixed

B. The current through the series Resistance (R_s) changes

C. The Zener resistance is constant

D. The resistance offered by the Zener changs

Answer: B::D

Watch Video Solution

124. To reduce the ripples in rectifier circuit with capacitor filter

A. R_L should be increased

B. input frequency should be decrease

C. input frequency should be increased

D. capacitors with high capacitance should be used

Answer: A::C::D

Watch Video Solution

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

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

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

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

D. strong electric field in the depletion region if the doping concentration is large

Answer: A::D

Watch Video Solution

126. The resistance of an intrisic semiconductor when heated

A. increases

B. remains constant

C. decreases linearly

D. decreases exponentially

Answer: D

Watch Video Solution

Watch Video Solution

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

A. 0.9

B. 0.7

C. 0.5

D. 1.1

Answer: C

Watch Video Solution

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

A. nmetallic bonding

B. van der Waal's bonding

C. ionic bonding

D. covalent bonding

Answer: A

Watch Video Solution

129. 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 decrease

B. both n and v will increase

C. n will increase but v will decrease

D. v will increase but n will decrease

Answer: C

Watch Video Solution

130. The probbility of electrons to be found in the conduction band of an intrinsit semiconductor at a finile temperature

A. increases exponentially with increasing band gap

B. decreases exponentially with increasing band gap

C. decreases with increasing temperature

D. is independent of the temperature and band gap.

Answer: B

Watch Video Solution

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

A. $4/7$

B. $5/8$

C. $4/5$

D. $5/4$

Answer: D

Watch Video Solution

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

A. In caseof C the valence band is not completaly filled at absolute zero temperature.

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

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

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

Answer: C

Watch Video Solution

133. The energy gap between conductionband and valence band is of the order of 0.07 eV. It is a/an

A. insulator

B. conductor

C. semiconductor

D. alloy

Answer: B

Watch Video Solution

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

A. n-type

B. p-type

C. Intrinsic semiconductor

D. None of the above

Answer: A

Watch Video Solution

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

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

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

C. $10^4 / m^3$

D. $10^2 / m^3$

Answer: A

Watch Video Solution

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

A. n-type with electron concentration

$n_e = 5 \times 10^{22} m^{-3}$

B. p-type with electron concentration

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

C. n-type with electron concentration

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

D. p-type with electron concentration

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

Answer: D

Watch Video Solution

137. Mobility of electron and holes in a sample of intristic germanium at room temperature are $0.36 m^2 V^{-1} s^{-1}$ and $0.17 m^2 V^{-1} s^{-1}$. The electron and hole densities are each equal to $2.5 \times 10^{19} m^{-3}$. The electrical conductivity of germanium is

A. $0.47 Sm^{-1}$

B. $1.09 Sm^{-1}$

C. $2.12 Sm^{-1}$

D. $4.24 Sm^{-1}$

Answer: C

Watch Video Solution

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

A. 1

B. > 1

C. lt 1, but not zero

D. zero

Answer: B

Watch Video Solution

139. In a semiconductor material $(1/5)$th of the total current is carried by the holes and the remaining is carried by the electrons. The drift speed of electrons is twice that of holes at this temperature. Thr ratio between the number densities of electrons and holes is

A. $21/6$

B. 5

C. $3/8$

D. 2

Answer: D

Watch Video Solution

140. The number density of free electrons in the semiconductor is $10^{18}m^{-3}$. It is doped with a pentavalent impurity atoms of number density $10^{24}m^{-3}$, the number density of free electrons m^{-3} increases by a factor of

A. $4/3$

B. 6

C. 10^{6}

D. 10^{24}

Answer: C

Watch Video Solution

141. A semiconductor having electron and linear mobilities μ_n and μ_p respectively.

If its intrinsic carrier density is n_i, then what will be the value of hole concentration P for which the conductivity will be maximum at a given temperature?

A. $n_i\sqrt{\frac{\mu_n}{\mu_p}}$

B. $n_h\sqrt{\frac{\mu_n}{\mu_p}}$

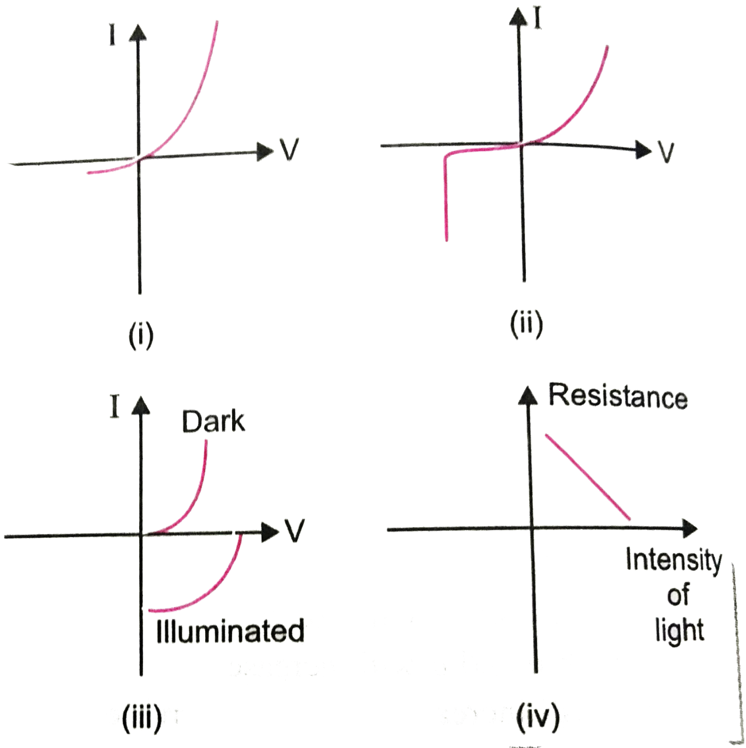
C. $n_i\sqrt{\frac{\mu_p}{\mu_n}}$

D. $n_h\sqrt{\frac{\mu_p}{\mu_n}}$

Answer: A

Watch Video Solution

142. Identify the semiconductor device where characteristics are given below, in the order (i), (ii) (iii), (iv):



A. simple diode, zener diode, solar cell, light dependent resistance

B. zener diode, simple diode, light dependent resistance, solar cell

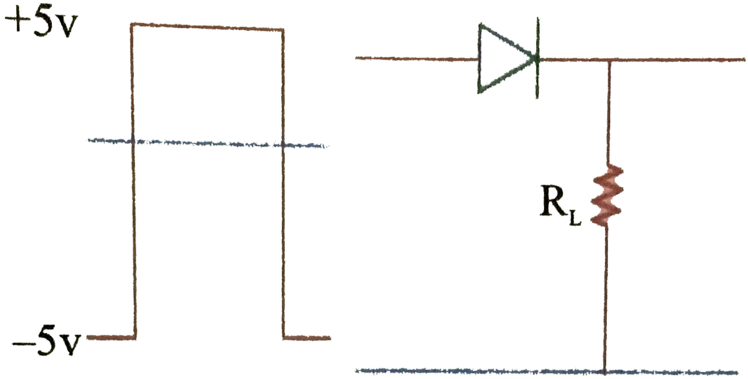
C. solar cell, light dependent resistance zener diode, simple diode

D. zener diode, solar cell simple diode light dependent resistance

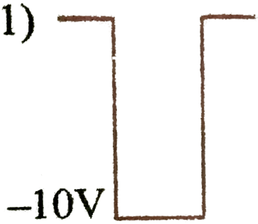
Answer: A

Watch Video Solution

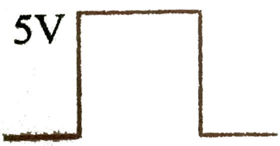
143. If a $p-n$ junction diode, a square input signal of $10V$ is applied as shown.

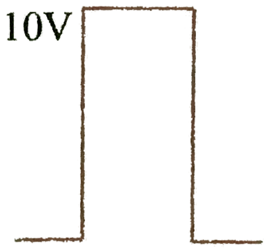


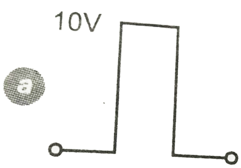
Then the out put signal across R_L will be

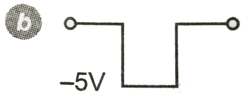
1) 

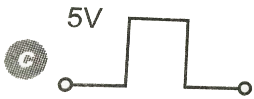
2) 

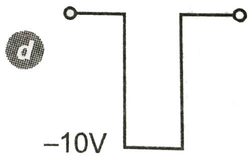
3) 

4) 

A. 

B. 

C. 

D. 

Answer: C

Watch Video Solution

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

A. drift in forward bias and diffusion in reverse bias

B. diffusion in forward bias and drift in reverse bias

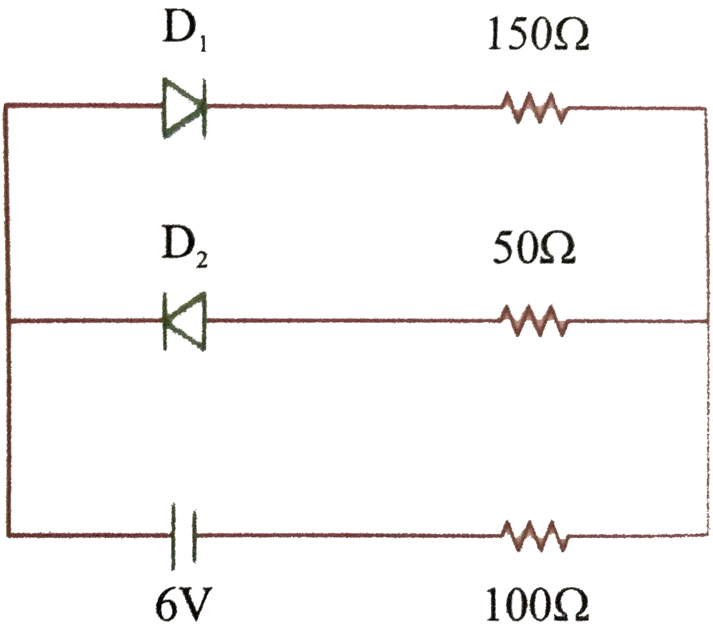
C. diffusion in both forward and the reverse bias

D. drift in both forward and reverse bias

Answer: B

Watch Video Solution

145. The circuit shown in figure (1) Contains two diodes each with a forward resistance of $50 ohm$ and with infinite reverse resistance. If the battery voltage is $6V$, the current through the $100 ohm$ resistance is.



A. zero

B. 0.02

C. 0.03

D. 0.36

Answer: B

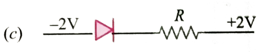
Watch Video Solution

Watch Video Solution

146. Which one of the following represents forward bias diode?

A. 

B. 

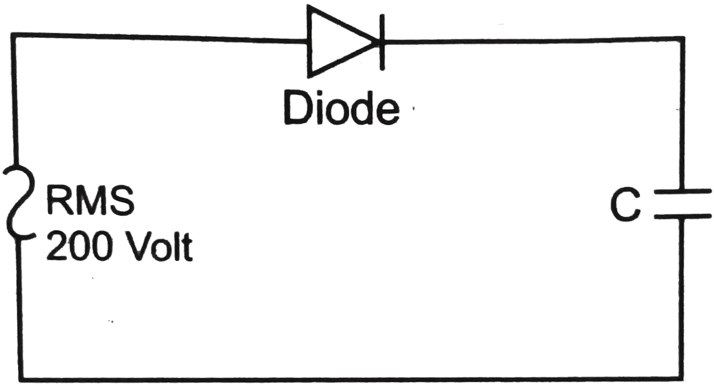
C. 

D. 

Answer: A

Watch Video Solution

147. A sinusiodal voltage of rms value 200 volt is connected to the diode and capacitor C in the shown so that half wave reactification occurs. The final potential difference in volt across C is



A. 500

B. 283

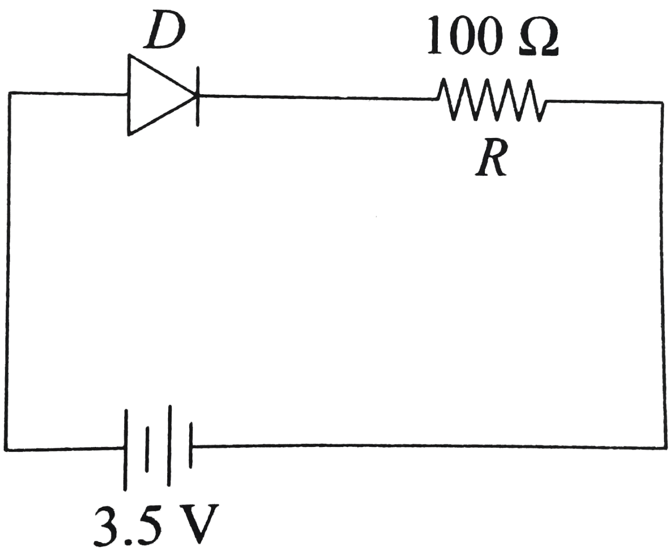
C. 200

D. 41

Answer: B

Watch Video Solution

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



A. 35mA

B. 30mA

C. 40mA

D. 20mA

Answer: B

Watch Video Solution

149. A diode having potential difference $0.5V$ across its junction which does not depend on current, is connected in series with resistance of 20Ω across source. If $0.1A$ passes through resistance then what is the voltage of the source?

A. 1.5V

B. 2.0 V

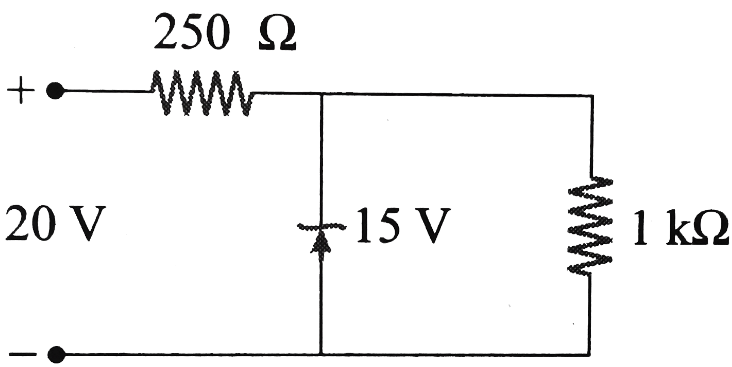
C. 2.5V

D. 5V

Answer: C

Watch Video Solution

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



A. 10mA

B. 15mA

C. 20 mA

D. 5mA

Answer: D

Watch Video Solution

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

Which is one of the following is correct?

A. (i) and (ii) only

B. (ii) only

C. (ii) and (iii) only

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

Answer: D

Watch Video Solution

152. The number of minority carriers crossing the junction of a diode depends primarily on the

A. concentration of doping impurities

B. magnitude of potential barrier

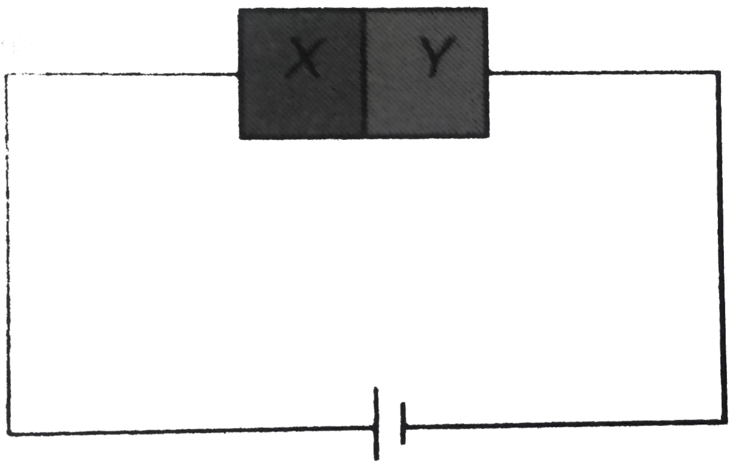
C. magnitude of the forward bias voltage

D. rate of thermal generation of electron-hole pair

Answer: D

Watch Video Solution

153. 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

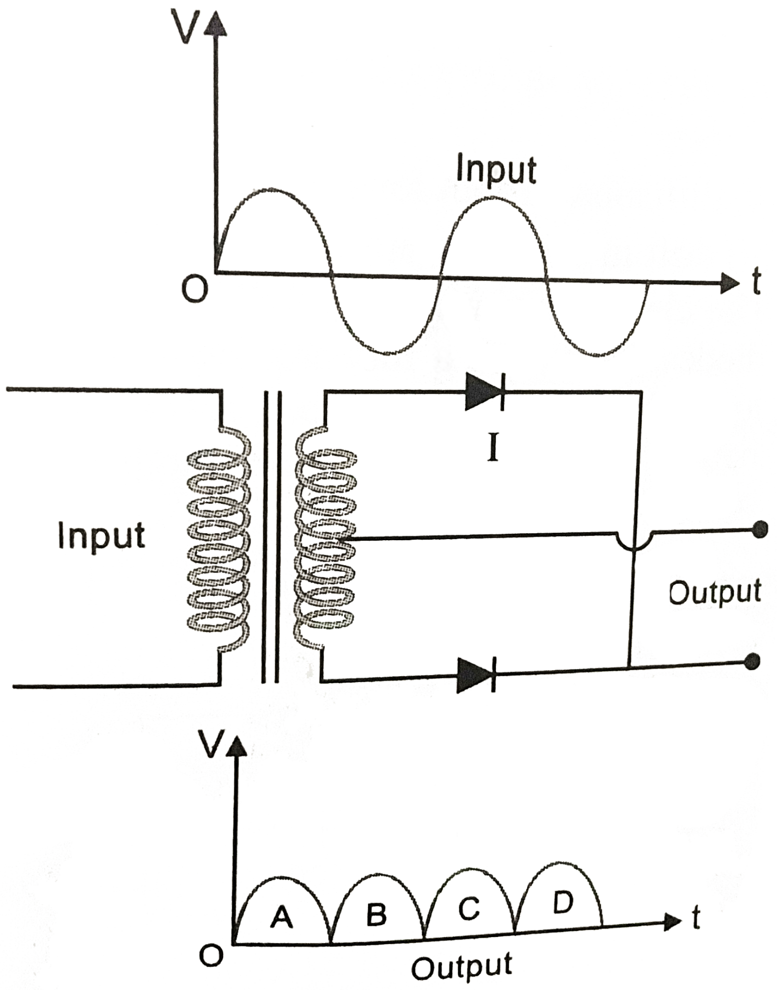
C. X is P-type, Y is N-type and the junction is reverse biased

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

Answer: D

Watch Video Solution

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



A. C

B. A, C

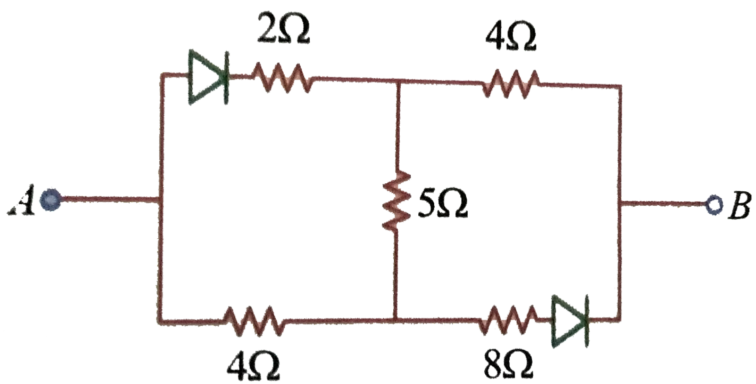
C. B, D

D. A, B, C, D

Answer: C

Watch Video Solution

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



A. 4Ω

B. 13Ω

C. 4Ω or 13Ω

D. 4Ω or 0Ω

Answer: C

Watch Video Solution

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

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

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

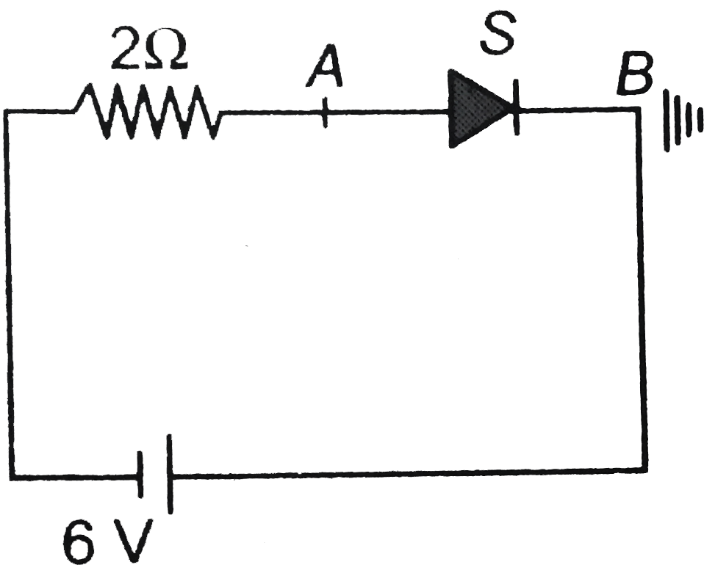
C. $\frac{kT}{e}\log_e\left(2.56\times10^{20}\right)$

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

Answer: A

Watch Video Solution

157. The diode shown in the circuit is a silicon diode. The potential difference between the points A and B will be



A. 6V

B. 0.6V

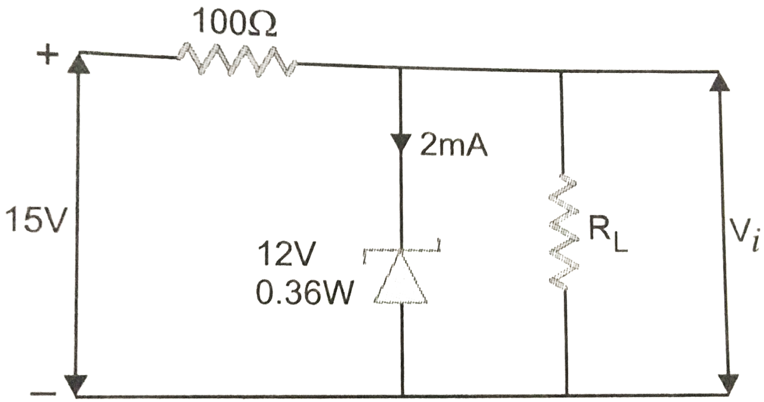
C. 0.7V

D. zero

Answer: A

Watch Video Solution

158. In the circuit Fig., what is the range over which the load resistance can be varied?



A. $298.6\Omega \leq R_L < \infty$

B. $303.7 mega \leq R_L < \infty$ only

C. $408.2 mega \leq R_L < \infty$ only

D. $428.6 mega \leq R_L < \infty$ only

Answer: D

Watch Video Solution

159. Two Zener diodes having specification $12V, \frac{1}{4}W$ are connected in series. If breakdown voltage of each diode is 5V, then what is the breakdown voltage in the series combination of the diodes?

A. 2.5V

B. 5V

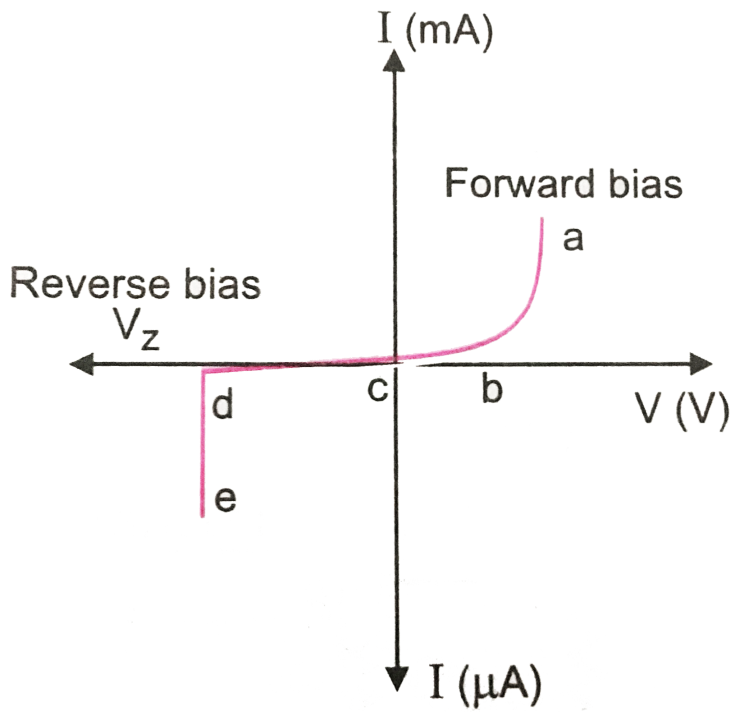
C. 10V

D. 12V

Answer: C

Watch Video Solution

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



A. ab

B. bc

C. cd

D. de

Answer: D

Watch Video Solution

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

A. 0.03 eV

B. 0.030 eV

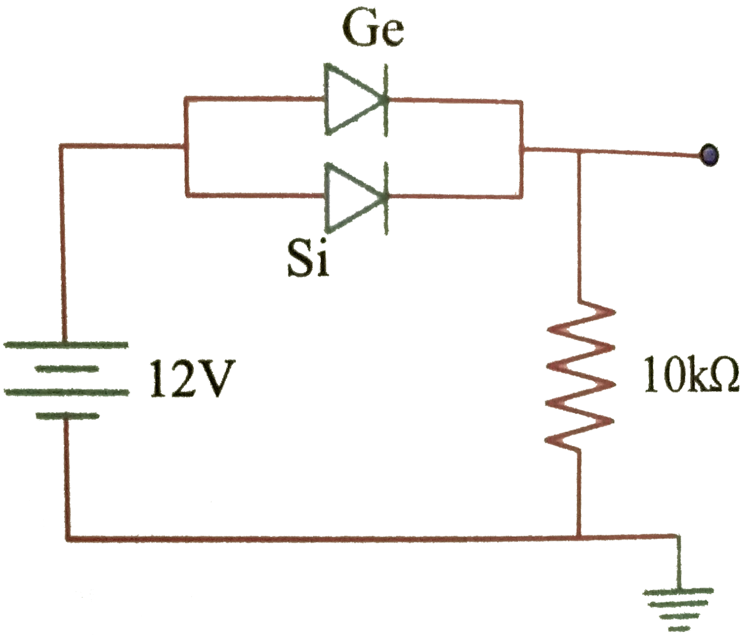
C. 0.45 eV

D. 0.60 eV

Answer: B

Watch Video Solution

162. Two junction diodes, one of germanium (Ge) and other of silicon (Si) are connected as shown in fig to a battery of $12V$ and a load resistance $10k\Omega$. The germanium diode conducts at $0.3V$ and silicon diode at $0.7V$. When current flows in the circuit, the potential of terminal Y will be



A. 12V

B. 11.7V

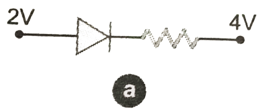
C. 11.3V

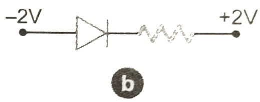
D. 11V

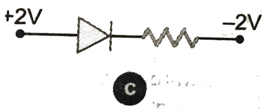
Answer: B

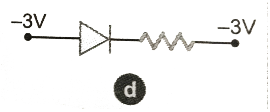
Watch Video Solution

163. The forward biased diode connection is

A. 

B. 

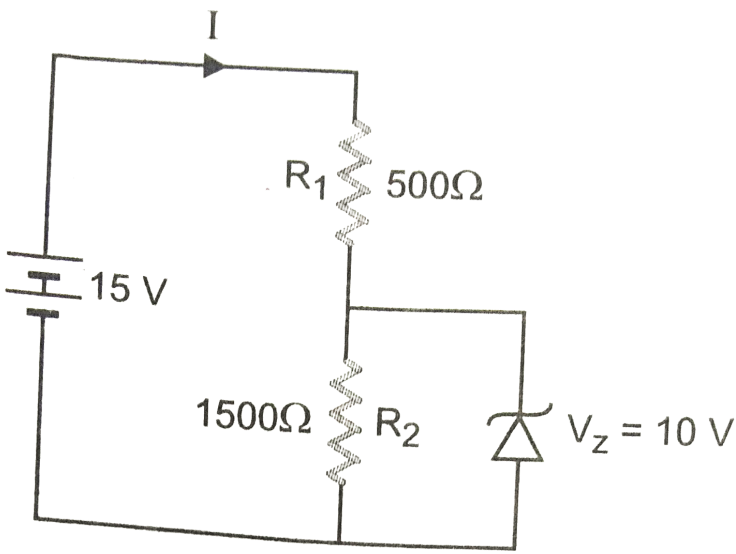
C. 

D. 

Answer: C

Watch Video Solution

164. In the circuit, Fig.he current through the zener diode is



A. 10 mA

B. 6.67 mA

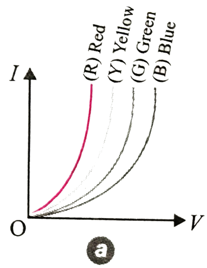
C. 5mA

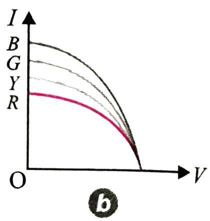
D. 3.33 mA

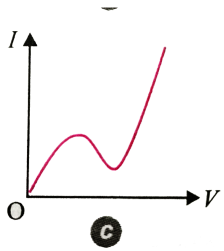
Answer: D

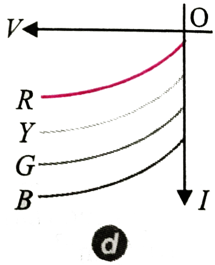
Watch Video Solution

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

A. 

B. 

C. 

D. 

Answer: A

Watch Video Solution

166. The currect voltage relation of a diode is given by $1 = \left(e^{vanv/T} - 1\right)mA$ where the applied volied V is in volts and the tempetature T is in degree kelvin if a student make an error meassurting $\pm 01V$ while measuring the current of $5mAat300K$ what be the error in the value of current in mA

A. 0.5 mA

B. 0.05 mA

C. 0.2 mA

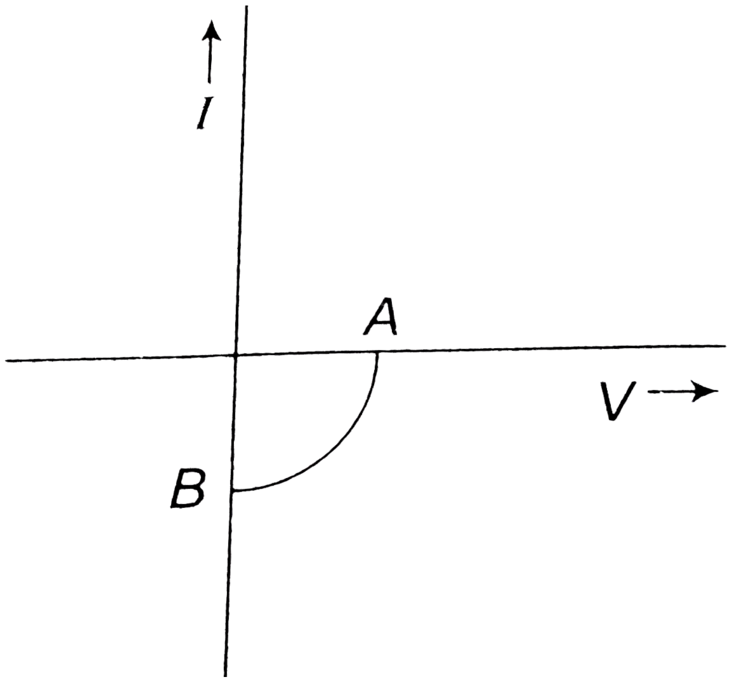
D. 0.02 mA

Answer: C

Watch Video Solution

167. The given graph represents $V - I$ characteristic for a semiconductor device.

which of the following statement is correct?



A. It is V-I characteristic for solar where point A represents open circuit voltage and point B short circuit current

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

C. It is for pfotodiode and point A and B represent open circuit voltage and current respectively

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

Answer: A

Watch Video Solution

168. For a common emiter configuration if a and β have their usualy meaning , the incorrrect relationship between a and β is :

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

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

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

D. $\alpha = \dfrac{\beta^2}{1+\beta^2}$

Answer: B::D

Watch Video Solution

169. The input signal given to a CE amplifier having a voltage gain of 150 is $V_i = 2\cos\left(15t + \dfrac{\pi}{3}\right)$. The corresponding output signal will be

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

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

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

D. $2\cos\left(15t + \dfrac{5\pi}{3}\right)$

Answer: A

Watch Video Solution

170. The current transfer ratio β of a transistor is 50. The input resistance of the transistor when used in common emitter mode is 1 kilo ohm. The peak value of the collector alternating current for an input peak voltage of 0.01 volt is

A. $0.01\mu A$

B. $0.25\mu A$

C. $100\mu A$

D. $500\mu A$

Answer: D

Watch Video Solution

171. 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. 1,2 and 3

B. 1 and 2

C. 2 and 4

D. 1 and 3

Answer: D

Watch Video Solution

172. For a transistor amplifier, the voltage gain

A. remain constant for all frequencies

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

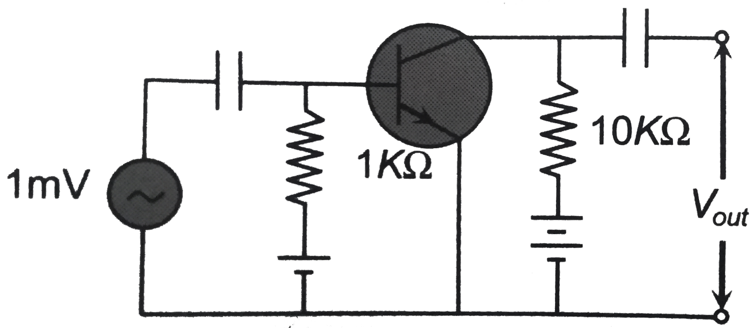
C. is low at high and low frequencies and constant at mid frequencies

D. none if the above

Answer: C

Watch Video Solution

173. In the following common emitter configuration an NPN transistor with current gain $\beta = 100$ is used. The output voltage of the amlifier will be



A. 10 mV

B. 0.1 V

C. 1.0 V

D. 10 V

Answer: C

Watch Video Solution

174. A CE amplifier has a voltage gain 50, an input impedance of 1000 ohm, and an output impendance of 200 ohm. The power gain of the amplifier will be

A. 24 dB

B. 41 dB

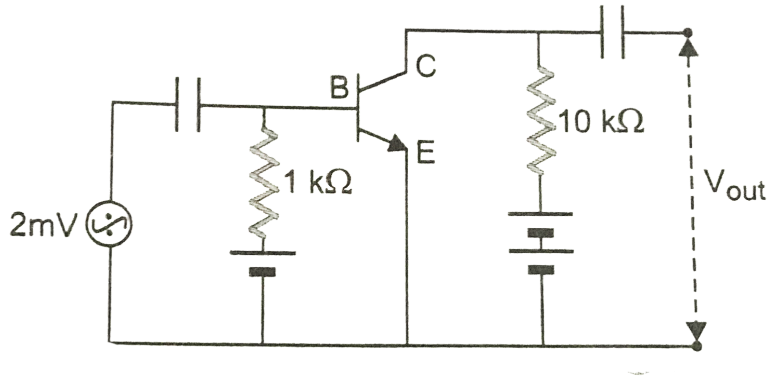
C. 250 dB

D. 12500 dB

Answer: B

Watch Video Solution

175. In the common emitter amplifier circuit, Fig. an npn transistor with output voltage of the amplifier as 1 V, the current gain of transistor amplifier is :



A. 20

B. 25

C. 50

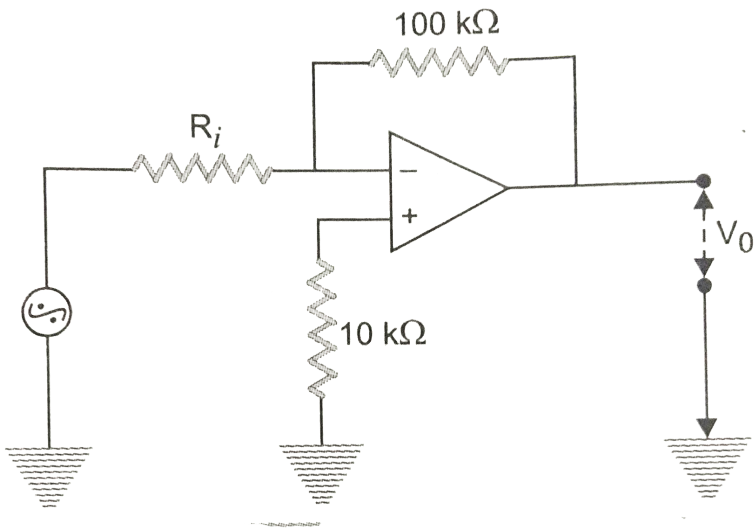
D. 75

Answer: C

Watch Video Solution

Watch Video Solution

176. The voltage gain of the following amplifier Fig. is 200. The value of input resistance R_i is



A. $0.2k\Omega$

B. $0.5k\Omega$

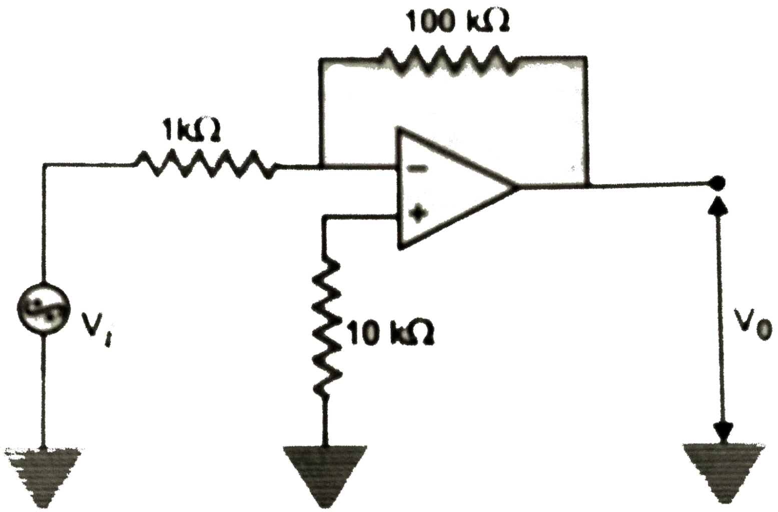
C. $1k\Omega$

D. $2k\Omega$

Answer: B

Watch Video Solution

177. The voltage gain of the amplifier shown in Fig.is



A. 10

B. 100

C. 1000

D. 9.9

Answer: B

Watch Video Solution

178. An amplifier has a voltage gain $A_v = 1000$. The voltage gain in dB is:

A. 30 dB

B. 60 dB

C. 3 dB

D. 20 dB

Answer: B

Watch Video Solution

Watch Video Solution

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

A. 90

B. 10

C. 1.25

D. 100

Answer: D

Watch Video Solution

180. For a common emitter amplifier, the audio frequency voltage across the collector resistance $2k\Omega$ is 2V. If the current amplication factor of the transistor is 200, and the base resistance is $1.5k\Omega$, the input signal voltage and base current are

A. 0.0075 V and $5\mu A$

B. 0.1 V and $1\mu A$

C. 0.15 V and $10\mu A$

D. 0.015 V and 1A

Answer: A

Watch Video Solution

181. In a common emitter configuration, a transistor has $\beta = 50$ and input resistance $1k\Omega$. If the peak value of a.c. input is 0.01 V then the peak value of collector current is

A. $0.01\mu A$

B. $0.25\mu A$

C. $100\mu A$

D. $500\mu A$

Answer: D

Watch Video Solution

182. In common emitter transistor amplifier circuit, the input signal voltage and the output collector voltage are

..............phase.

A. 135°

B. 180°

C. 45°

D. 90°

Answer: B

Watch Video Solution

183. A npn transistor is connected in common emitter configuration in a given amplifier. A load resistance of $800\Omega$is connected in the collector circuit and the voltage drop across 0.96 and the input resistance of the circuit is 192Ω, the voltage gain and the power gain of the amplifier will respectively be :

A. 4, 3.84

B. 3.69, 3.84

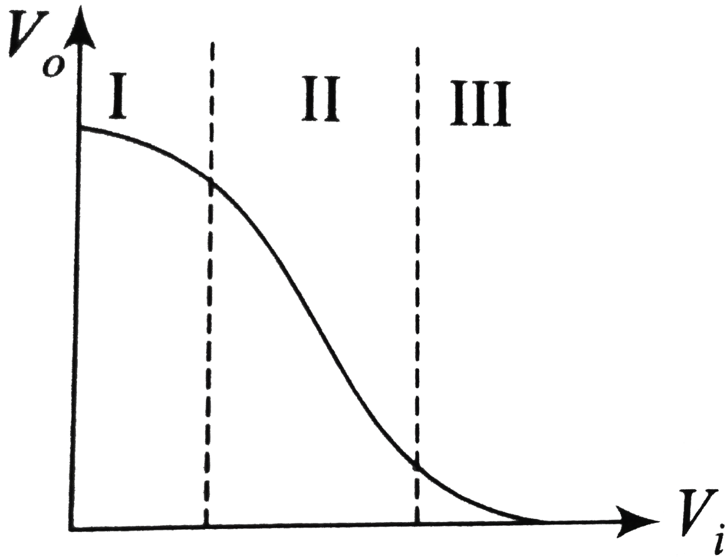
C. 4, 4

D. 4, 3.69

Answer: A

Watch Video Solution

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



A. in region III

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

C. in region II

D. in region I

Answer: B

Watch Video Solution

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

A. 200 and 1000

B. 15 and 200

C. 150 and 15000

D. 20 and 2000

Answer: C

Watch Video Solution

186. The Boolean expression $P+\overline{P}Q$, where P and Q are the inputs of the logic circuit, represents

A. AND gate

B. NAND gate

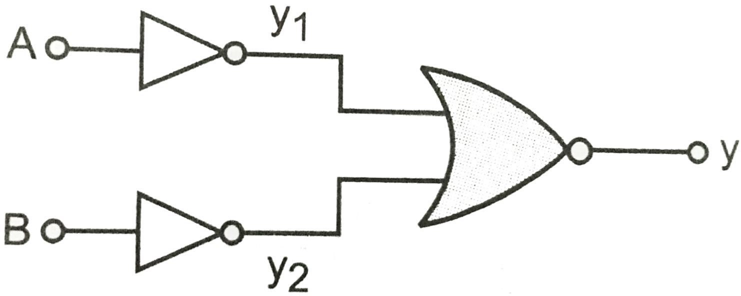
C. NOT gate

D. OR gate

Answer: D

Watch Video Solution

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



A. NAND

B. AND

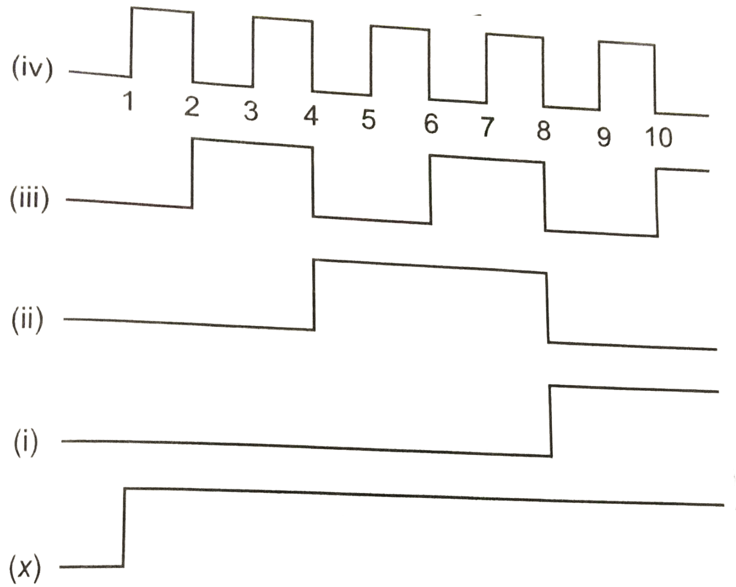
C. NOR

D. OR

Answer: B

Watch Video Solution

188. If (i), (ii), (iii), (iv) are inputs to a gate and x is output, then as per the following time graph the gate is



A. NOT

B. AND

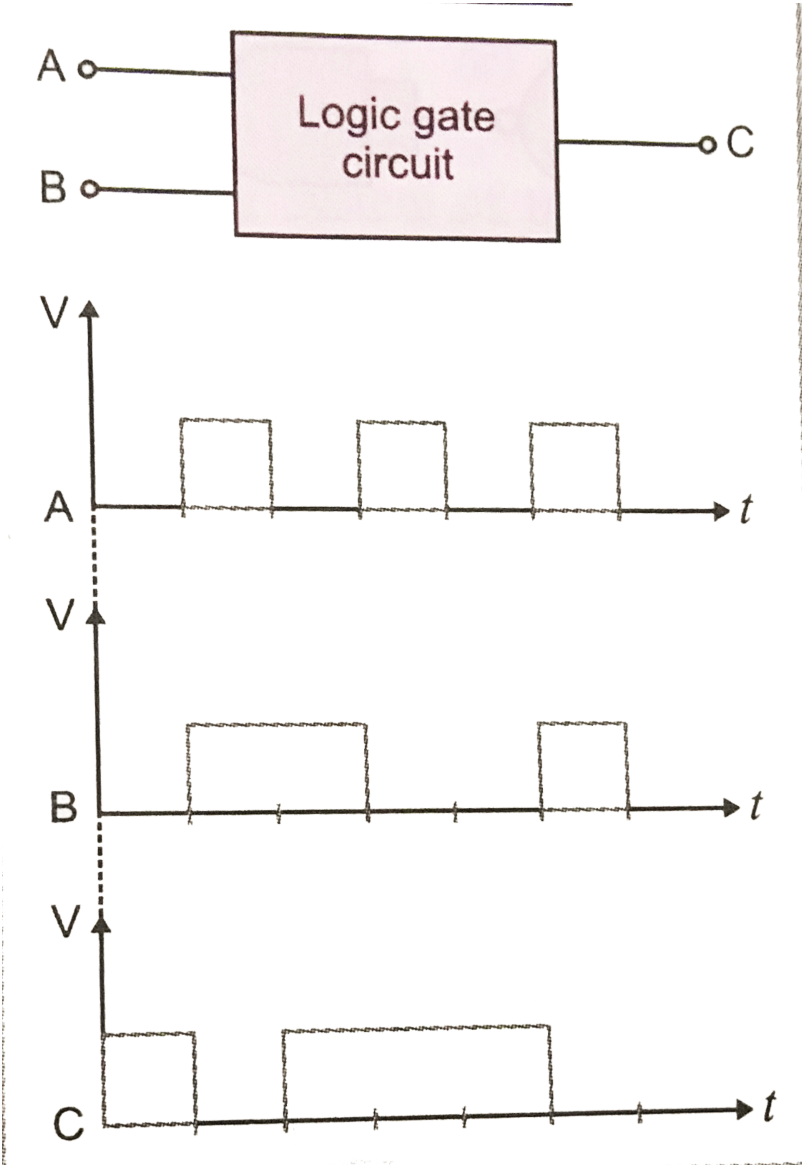
C. OR

D. NAND

Answer: C

Watch Video Solution

189. Fig, shows a logic gate circuit with two input A and B and the output C. The voltage wave form of A, B and C are as shown in Fig.The logic gate circuit is



A. OR gate

B. AND gate

C. NOR gate

D. NAND gate

Answer: D

Watch Video Solution

190. To write the decimal number 37 in binary, how many binary digit are required?

A. 5

B. 6

C. 7

D. 4

Answer: B

Watch Video Solution

191. What is the decimal number of binary number $(111001.01)_2$?

A. 9.625

B. 25.265

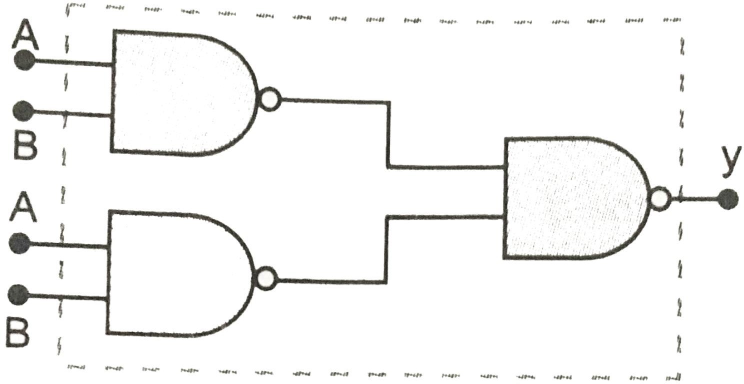
C. 26.625

D. 26.265

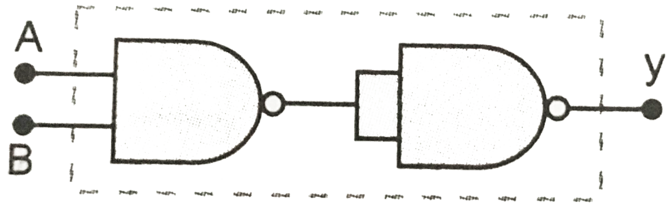
Answer: C

Watch Video Solution

192. The combination of the 'NAND' gates shown here (Fig.) and (ii)) are equivalent to



i



ii

A. (i) an AND gate and (ii) an AND gate

B. (i) an AND gate and (ii) an NOT gate

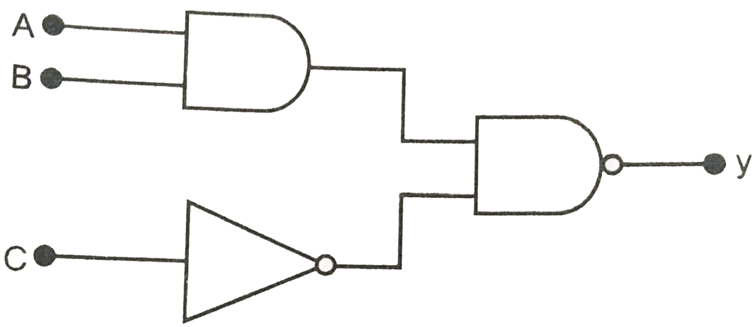
C. (i) an AND gate and (ii) an OR gate

D. (i) an OR gate and (ii) an NOT gate

Answer: A

Watch Video Solution

193. In the circuit Fig. the output y becomes zero for the inputs



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

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

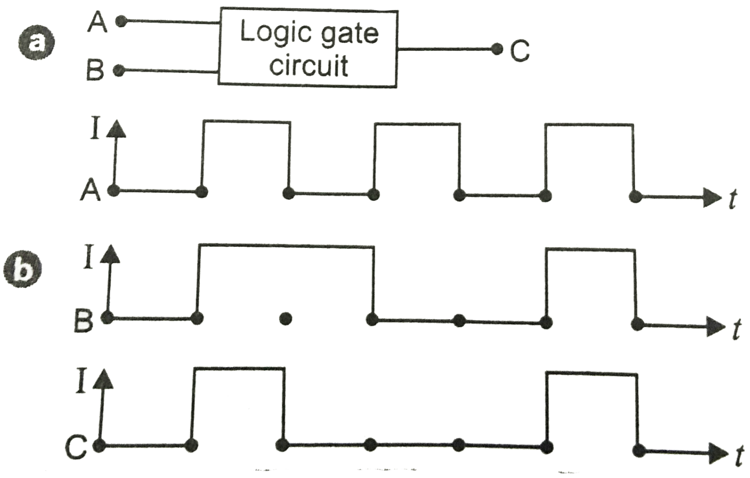
C. $A=0, B=0, C=0$

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

Answer: D

Watch Video Solution

194. The Fig.shows a logic gate circuit with two inputs A and B and the output C are as shown in Fig.



A. OR gate

B. AND gate

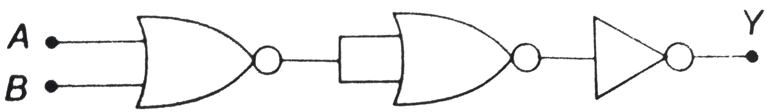
C. NAND gate

D. NOR gate

Answer: B

Watch Video Solution

195. The given electrical network is equivalent to:



A. AND gate

B. OR gate

C. NOR gate

D. NOT gate

Answer: C

Watch Video Solution

196. How many gates are required to design ,$y = A + \overline{A}.B$?

Also name the gates

A. 1, OR gate

B. 2, AND and OR gate

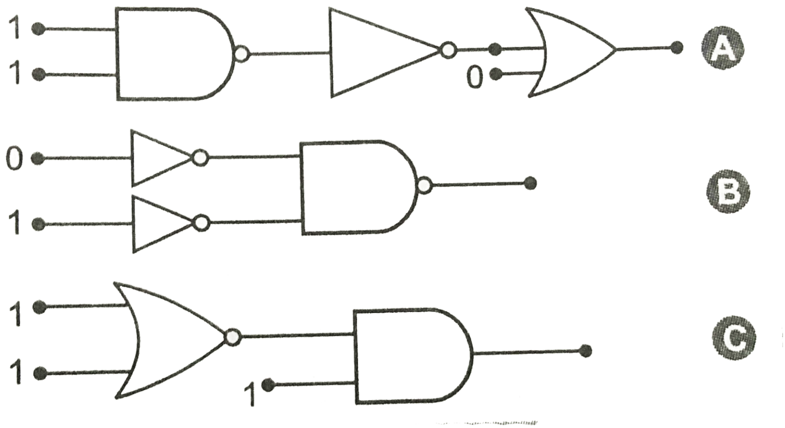
C. 3, AND, NOT and OR

D. 4, two NOT gates and two AND gates

Answer: A

Watch Video Solution

197. In the following combinations of logic gates, the outputs A, B and C are respectively



A. 0, 1, 1

B. 0, 1, 0

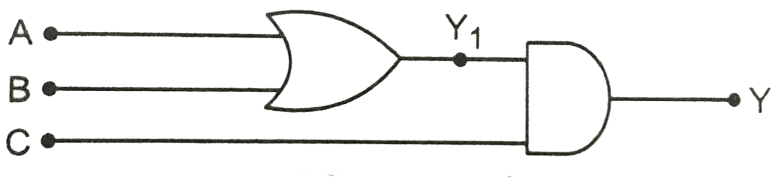
C. 1, 1, 0

D. 1, 0, 1

Answer: C

Watch Video Solution

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



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

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

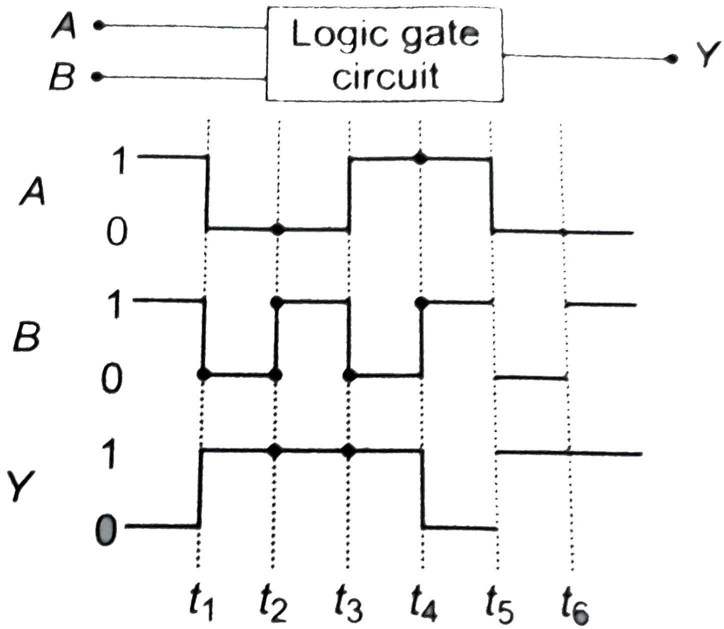
C. $\begin{matrix} A & B & C \\ 1 & 0 & 1 \end{matrix}$

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

Answer: C

Watch Video Solution

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



A. NOR gate

B. OR gate

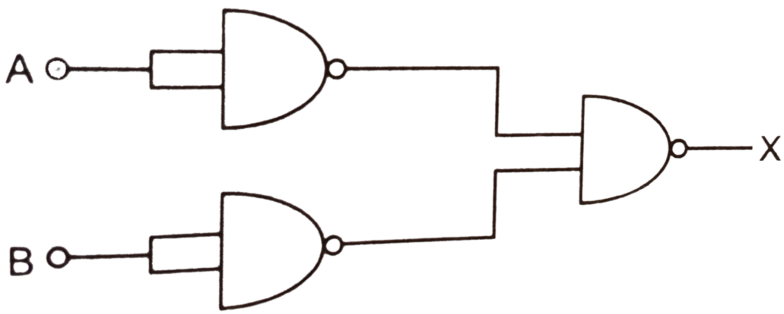
C. AND gate

D. NAND gate

Answer: D

Watch Video Solution

200. The comdination of gates shown below yields



A. NOT gate

B. XOR gate

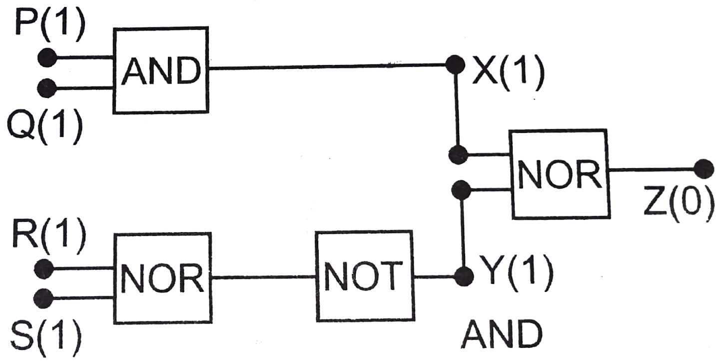
C. NAND gate

D. OR gate

Answer: D

Watch Video Solution

201. The circuit diagram (see fig.) shows a 'logic combination' with the states outputs X, Y and Z given for input P, Q, R and S all at state 1 (i.e., high). When inputs P and R change to state 0 i.e., low) with inputs Q and S still at 1, the condition of output X, Y and Z chages to



A. 1, 0, 0

B. 1, 1, 1

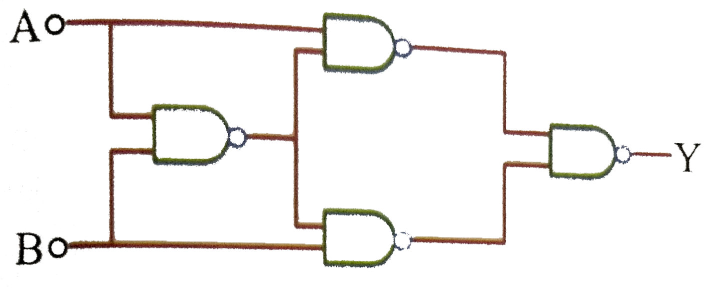
C. 0, 1, 0

D. 0, 0, 1

Answer: C

Watch Video Solution

202. Truth table for system of four $NAND$ gates as shown in figure is :



.

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

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

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

D. $\begin{vmatrix} A & B & Y \\ 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 1 \end{vmatrix}$:

Answer: A

Watch Video Solution

203. The electrical conductivity of pure silicon can be increased by

A. increasing the temperature

B. doping donor impurities

C. doping acceptor impurities

D. falling ultraviolet light on it

Answer: A::B::C::D

Watch Video Solution

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

A. the emitter current will be 7.5 mA

B. the emitter current will be 12.5 mA

C. the base current will be 3.5 mA

D. the base current will be 2.5 mA

Answer: B::D

Watch Video Solution

205. In a normal operation of a transistor,

A. the base-collector junction is forward biased

B. the base-collector junction is reverse biased

C. the base-emitter junction is forward biased

D. the base-emitter junction is reverse biased

Answer: B::C

Watch Video Solution

206. In an n-p-n transistor circuit, the collector current ia 10 mA. If 90% of the electrons emitted reach the collector.

A. the emitter current will be 9 mA

B. the base current will be 1 mA

C. the emitter current will be 11 mA

D. the base current will be -1 mA

Answer: B::C

Watch Video Solution

207. Which of the following is/are correct relations in Boolean algebra?

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

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

C. $\overline{A.\,B + \overline{A}.\,\overline{B}} = \left(\overline{A.\,B}\right).\left(\overline{\overline{A}} + \overline{\overline{B}}\right)$

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

Answer: C

Watch Video Solution

208. The true statement (s) for a semiconductor is (are)

A. conductivity is less than conductors and more than non-conductors

B. Its temperature coefficient of resistance is negative

C. It works at absolute zero temperature as an ideal non-conductor

D. In pure state, silicon germanion are called intrinsic semiconductors.

Answer: A::B::C::D

Watch Video Solution

209. Which of the following is/are correct equations in Boolean algebra?

A. $A+B+C=A+(B+C)$

B. $A+0=A$

C. $A+1=A$

D. $A+A=A$

Answer: A::B::D

Watch Video Solution

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

A. phosphorous

B. boron

C. antimony

D. aluminium

Answer: B::D

Watch Video Solution

211. A transistor is connected in common emitter mode. The collector supply is 10 volt and the voltage drop across resistor of $1k\Omega$ in the collector circuit is 0.5 volt. If the current gain beta is 49, then

A. the base current is $50\mu A$

B. current gain α is 0.98

C. the emitter current is about $510\mu A$

D. the base current is $30\mu A$

Answer: B::C

Watch Video Solution

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

A. $17 + 9.625$

B. $15 + 9.625$

C. $26 + 0.625$

D. $24 + 0.625$

Answer: A::C

Watch Video Solution

213. The distinction between conductors, insulators and semiconductors is largely connected with

A. the type of crystal lattice

B. binding energy of their electrons

C. relative wudth of their energy gap

D. their ability to conduct current

Answer: C::D

Watch Video Solution

214. For an intrinsic semiconductor, the statement//statements that hold good are:

A. an intrinsic semiconductor is a perfect insulator at 0K

B. the number of charge carriers varies with temperature in an exponential way

C. the number density of electrons in always more than the number density of holes

D. the mobility of electrons is more than that of holes.

Answer: A::B::D

Watch Video Solution

215. Which of the following statements concerning the depletion zone of an unbiased p-n junction is (are) true?

A. The width of the zone is independent of the densities of the dopants (impurities)

B. The width of the zone is dependent on the densities of the dopants (impurities)The width

C. The electric field in the zone is provided by the electrons in the conduction band and holes in the valence band.

D. The electric field in the zone is produced by the ionized dopant atoms.

Answer: A::D

Watch Video Solution

216. The light emitting diode (LED),

A. is made from the semiconducting compound gallium arsenide phosphide

B. emit light when forward biased

C. is made from one of the two basic semiconducting materials, silicon or germanium

D. emit light when reverse biased.

Answer: A::B

Watch Video Solution

217. In a p-n junction with open ends,

A. there is no net charge transfer between the two sides

B. there is a constant electric field near the junction

C. the holes and conduction electrons systematically go from the p-side to n-side and from n-side to p-side respectively

D. there is no systematic motion of charge carriers.

Answer: A::B::D

Watch Video Solution

218. In boolean algebra, if $A = B = 1$, then the value of $(A.\,B + A)$ is

A. A

B. B

C. $A + B$

D. $B.\,A + A$

Answer: A::B::C::D

Watch Video Solution

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

A. A

B. B

C. $A + B$

D. $A.B$

Answer: A::C

Watch Video Solution

220. A piece of pure semiconductor of silicn of size $1cm \times 1cm \times 1mm$ is having 5×10^{28} number of atoms per cubic metre. It is doped simultaneously with 5×10^{22} atoms per m^3 of aresenic adn 5×10^{20} per m^3 atoms of indium. The number density of intrisic current carrier (electrons adn holes) in the pure silicon semiconductor is $1.5 \times 10^{16} m^{-3}$.

Mobility of electron is $3800 cm^2 V^{-} S^{-1}$

The number of electrons in this semiconductor are

A. 5.0×10^{15}

B. 4.95×10^{15}

C. 4.95×10^{22}

D. 25×10^{22}

Answer: B

Watch Video Solution

221. A piece of pure semiconductor of silicn of size $1cm \times 1cm \times 1mm$ is having 5×10^{28} number of atoms per cubic metre. It is doped simultaneously with 5×10^{22} atoms per m^3 of aresenic adn 5×10^{20} per m^3 atoms of indium.

The number density of intrisic current carrier (electrons adn holes) in the pure silicon semiconductor is $1.5 \times 10^{16} m^{-3}$. Mobility of electron is $3800 cm^2 V^{-} S^{-1}$

The number of holes in this semiconductor are

A. 5.0×10^{20}

B. 4.54×10^{13}

C. 4.54×10^{9}

D. 4.54×10^{2}

Answer: D

Watch Video Solution

222. A piece of pure semiconductor of silicn of size $1 cm \times 1 cm \times 1 mm$ is having 5×10^{28} number of atoms per cubic metre. It is doped simultaneously with 5×10^{22} atoms per m^3 of aresenic adn 5×10^{20} per m^3 atoms of indium. The number density of intrisic current carrier (electrons adn holes) in the pure silicon semiconductor is $1.5 \times 10^{16} m^{-3}$. Mobility of electron is $3800 cm^2 V^{-} S^{-1}$

The conductivity of doped semiconductor (in Sm^{-1}) is

A. 2×10^3

B. 3×10^3

C. 4×10^3

D. 1×10^3

Answer: B

Watch Video Solution

223. A piece of pure semiconductor of silicn of size $1cm \times 1cm \times 1mm$ is having 5×10^{28} number of atoms per cubic metre. It is doped simultaneously with 5×10^{22} atoms per m^3 of aresenic adn 5×10^{20} per m^3 atoms of indium. The number density of intrisic current carrier (electrons adn holes) in the pure silicon semiconductor is $1.5 \times 10^{16} m^{-3}$. Mobility of electron is $3800 cm^2 V^{-} S^{-1}$

Ratio of conductivity of doped silicon and pure silicon semiconductor is

A. 2.2×10^6

B. 3.3×10^6

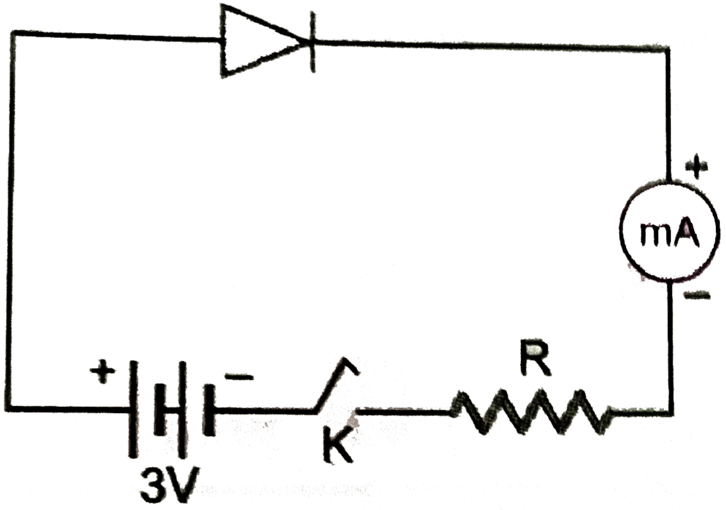
C. 2.2×10^8

D. 3.3×10^8

Answer: B

Watch Video Solution

224. When a p-type semiconductor is brought into a close contact with n-type semiconductor, we get a p-n junction with a barrier potential $0.4V$ and the width of depletion region is $4.0 \times 10^{-7}m$. this p-n junction is forwaed biased with a battery of voltage $3V$ adn negligible internal resistance, in series with a resistance of resistance R, ideal milliammeter and key K as shown in Fig.



The intensity of the electric field in the depletion region when p-n junction is unbiased is

A. $0.5 \times 10^6 Vm^{-1}$

B. $1.0 \times 10^6 Vm^{-1}$

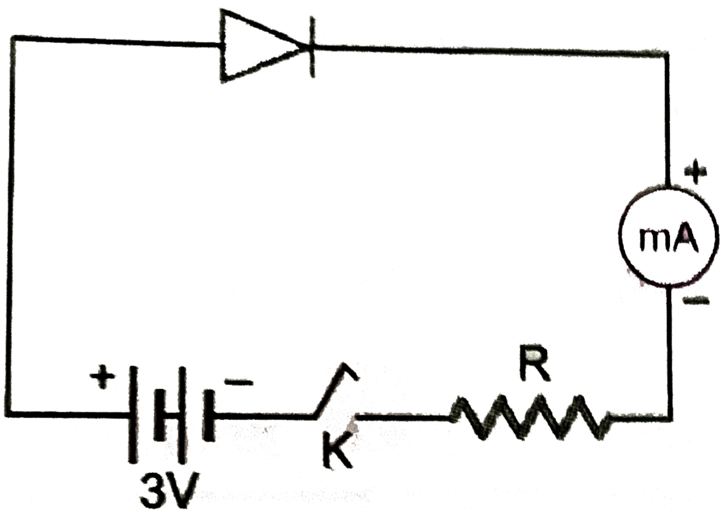
C. $2.0 \times 10^6 Vm^{-1}$

D. $1.5 \times 10^6 Vm^{-1}$

Answer: B

Watch Video Solution

225. When a p-type semiconductor is brought into a close contact with n-type semiconductor, we get a p-n junction with a barrier potential $0.4V$ and the width of depletion region is $4.0 \times 10^{-7} m$. this p-n junction is forwaed biased with a battery of voltage $3V$ adn negligible internal resistance, in series with a resistance of resistance R, ideal milliammeter and key K as shown in Fig.



The resistance of resistor R is

A. 150Ω

B. 300Ω

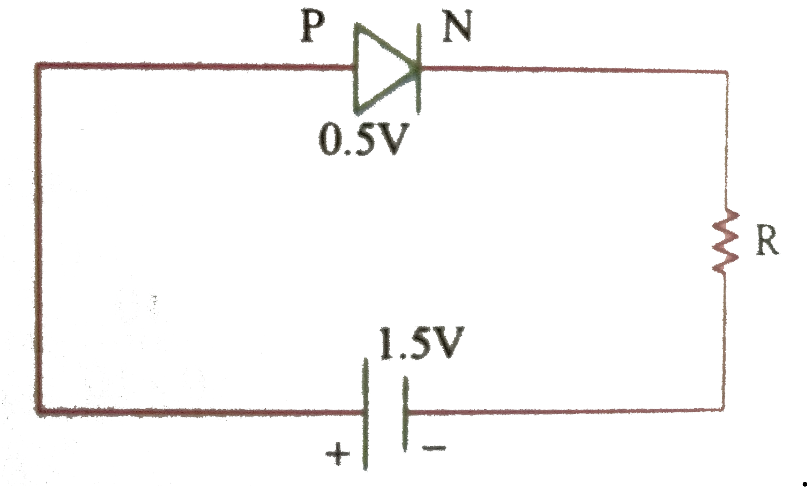
C. 130Ω

D. 180Ω

Answer: C

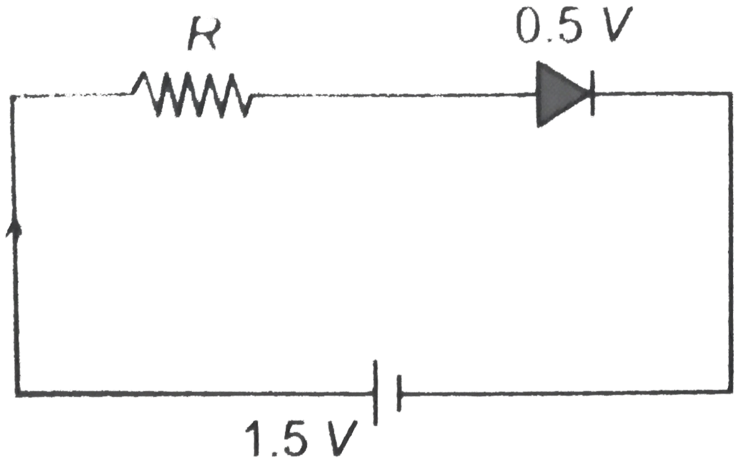
Watch Video Solution

226. A PN junction diode when forward biased has a drop of $0.5V$ which is assumed to be independent of current. The current in excess of $10mA$ through the diode produces large joule heating which damages the diode. If we diode, the resistor used in series with the diode so that the maximum current does not exceed $5mA$ is.



Watch Video Solution

227. 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?



Watch Video Solution

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

Watch Video Solution

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

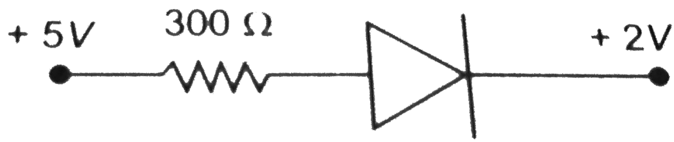
Watch Video Solution

230. The number desnity of donor atoms which have to be added to an intrinsic germanium semiconductor to produce an n-type semiconductor of conductivity $5 ohm^{-1} cm^{-1}$ is $a \times 10^{15} cm^{-3}$. Given that the mobility of electron in n-type Ge is $3900 cm^2 / Vs$, Neglect the contribution of holes to conductivity. What is the integer value of a?

Watch Video Solution

231. Assertion : The value of current through $P - n$ junction in the given figure will be $10 mA$.

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



A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: B

Watch Video Solution

232. Assertion : In a common emitter transistor amplifier, the input current is much less than output current.

Reason : The common-emitter transistor amplifier has a very high input impedance.

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: C

Watch Video Solution

233. Assertion : Any logic can be constructed using NAND gate

Reason : NAND gate can be converted to OR gate by simply joining the two inputs.

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: C

Watch Video Solution

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

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

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: A

Watch Video Solution

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

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

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: B

Watch Video Solution

236. Assertion : p-n junction diode can be used even at ultra high frequencies.

Reason : Capacitative reactance of a p-n junction diode increases as frequency increases.

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: C

Watch Video Solution

237. Assertion: Two $P-N$ junction diodes placed back to back, will work as a NPN transistor.

Reason: The $P-N$ junction of two PN junction diodes back to back will form the base of NPN transistor.

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: D

Watch Video Solution

238. Assertion : The colour of light emitted by a LED depends on its forward biasing.

Reason : The reverse biasing of p-n junction will lower the width of depletion layer.

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: D

Watch Video Solution

239. Assertion : When baseregion has larger width, the collector current increases.

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

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: D

Watch Video Solution

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

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

A. if both the Assertion and Reason are true and the Reason is the correct explanation of Assertion.

B. if both the Assertion and Reason are true but the reason in not a correct explanation of the Assertion.

C. if the Assertion is true but the Reason is false.

D. if both Assertion and Reason are false.

Answer: A

Watch Video Solution

241. Statement-1 : The temperature coefficient of resistance is positive for metals and negative for p-type semiconductor.

Statement-2 : The effective charge carriers in metals are negatively charged whereas in p-type semiconductor, they are positively charged

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation of Statement-1.

C. Statement-1 is true, Statement-2 is false.

D. Statement-1 is false, Statement-2 is true.

Answer: B

Watch Video Solution

242. Statement-1 : When the temperature of a semiconductor is increased, then its resistance decreases.

Statement-2 : The energy gap between conduction band and valence band is very small for semiconductor.

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation of Statement-1.

C. Statement-1 is true, Statement-2 is false.

D. Statement-1 is false, Statement-2 is true.

Answer: A

Watch Video Solution

243. Statement-1 : A p-type semiconductor has ney positive charge on it.

Statement-2 : Holes are majority carriers in it.

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation of Statement-1.

C. Statement-1 is true, Statement-2 is false.

D. Statement-1 is false, Statement-2 is true.

Answer: D

Watch Video Solution

244. Statement-1 : At a fixed temperature, silicon will have a minimum conductivity when it has a smaller acceptor doping. Statement-2 : The conductivity of an intrinsic semiconductor is slightly higher than that of a lightly doped p-type semiconductor.

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation of Statement-1.

C. Statement-1 is true, Statement-2 is false.

D. Statement-1 is false, Statement-2 is true.

Answer: C

Watch Video Solution

245. Statement-1 : The direction of diffusion current in a junction diode is from n-region to p-region.

Statement-2 : The majority current carrier diffuse from a region of higher concentration to a region of lower concentration.

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation of Statement-1.

C. Statement-1 is true, Statement-2 is false.

D. Statement-1 is false, Statement-2 is true.

Answer: D

Watch Video Solution

246. Statement-1 : A transistor with common emitter mode has current gain 50. When base current is $5\mu A$, the emitter current is $0.255mA$.

Statement-2 : $I_e = I_b + I_c$

and $\beta = I_c / I_b$

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation of Statement-1.

C. Statement-1 is true, Statement-2 is false.

D. Statement-1 is false, Statement-2 is true.

Answer: A

Watch Video Solution

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

Reason: NOT gate inverts the input order.

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation of Statement-1.

B. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation of Statement-1.

C. Statement-1 is true, Statement-2 is false.

D. Statement-1 is false, Statement-2 is true.

Answer: A

Watch Video Solution

248. A specimen of silicon is to be made p-type semiconductor. For this one atom of indium, on an average is doped in 5×10^7 silicon atoms. If the number density of silicon is $5 \times 10^{28} \text{atoms} / m^3$, then the number of acceptor atoms per cm^3 is

A. 10^{21}

B. 10^{14}

C. 10^{15}

D. 10^{12}

Answer: C

Watch Video Solution

249. For n-type semiconductor, it is stated that

(i) there are more number of electrons and less number of holes.

(ii) there are less number of electrons and less number of holes.

(iii) it is negatively charged.

it is electrically neutral.

A. Only (i) is correct

B. Only (i) and (iii) are correct

C. Only (ii), (iii) and (iv) are correct

D. Only (i) and (iv) are correct

Answer: D

Watch Video Solution

250. Suppose the energy liberated in the recombination of a hole-electron pair is converted into electromagnatic radiation. If the maximum wavelength emitted is 660nm, what is the band width? (Use $h = 6.6 \times 10^{-34} J - s$)

A. 0.1875 eV

B. 1.875 eV

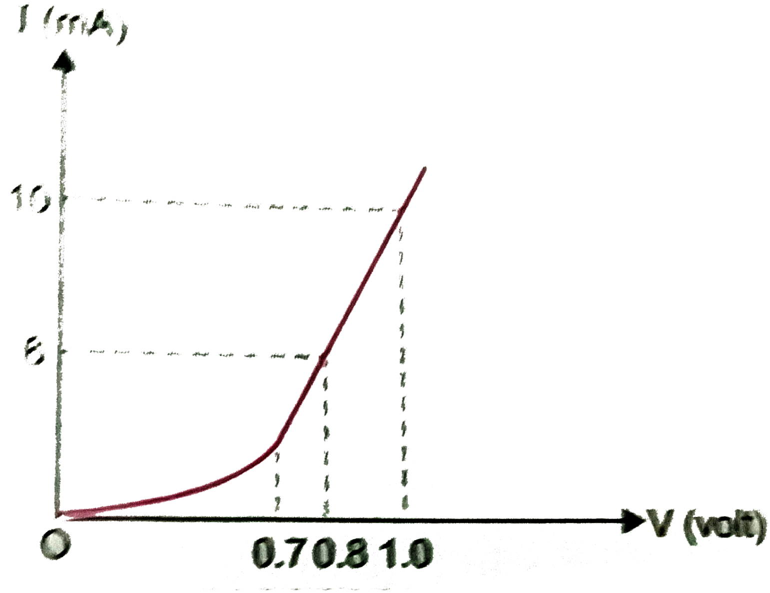
C. 0.938 eV

D. 0.625 eV

Answer: B

Watch Video Solution

251. The forward characteristic of p-n junction is shown in Fig.What is the dynamical resistance of p-n junction at $0.9V$?



A. 130Ω

B. 100Ω

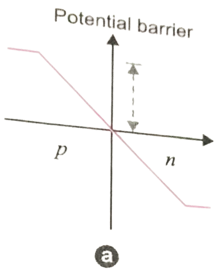
C. 50Ω

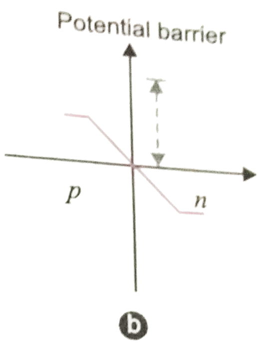
D. 30Ω

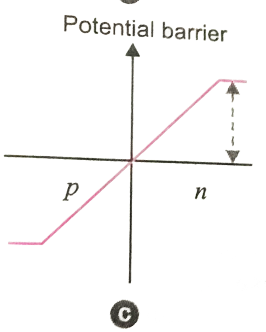
Answer: C

Watch Video Solution

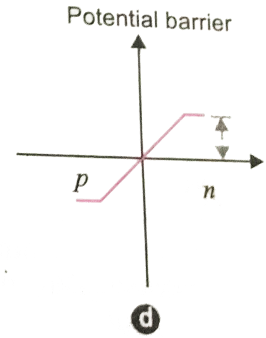
252. In a forward biased PN- junction diode, the potential barrier in the depletion region is of the from...

A. 

B. 



C.

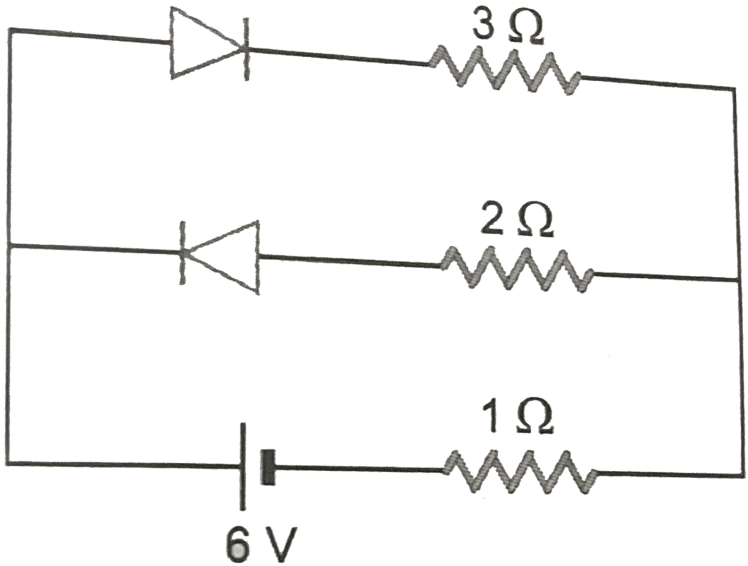


D.

Answer: D

Watch Video Solution

253. What is the current through 1Ω resistance? Fig.



A. 1.6 A

B. 1.5 A

C. 3.0 A

D. 6.0 A

Answer: B

Watch Video Solution

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

A. 3

B. 6

C. 10

D. 20

Answer: B

Watch Video Solution

255. The conduction band of a solid is partially filled at 0 K.will it be a conductor, a semiconductor or an insulator?

A. conductor

B. semiconductor

C. insulator

D. none of these

Answer: A

Watch Video Solution

256. In a good conductor of electricity the type of bonding that exists is :

A. ionic

B. vander waals

C. covalent

D. metallic

Answer: D

Watch Video Solution

257. In intrinsic semiconductor at room temperature, the number of electrons and holes are

A. equal

B. zero

C. unequal

D. infinite

Answer: A

Watch Video Solution

258. The forbidden energy band gap in conductors, semiconductors and insulators are EG_1, EG_2 and EG_3 respectively. The relation among them is

A. $E_{G1} = E_{G2} = E_{G3}$

B. $E_{G1} > E_{G2} > E_{G3}$

C. $E_{G1} < E_{G2} < E_{G3}$

D. $E_{G1} < E_{G2} > E_{G3}$

Answer: C

Watch Video Solution

259. In an n-type semiconductor, the fermi level lies 0.3 eV below the conduction band at 300 K. If the temperature is increased to 330K, where does the new position of the Fermi level lie?

A. 0.55 eV below the conduction band

B. 0.44 eV below the conduction band

C. 0.33 eV below the conduction band

D. 0.27 eV below the conduction band

Answer: D

Watch Video Solution

260. n-type semiconductor is obtained when

A. germanium is doped with arsenic

B. germanium is doped with indium

C. germanium is doped with aluminium

D. silicon is doped with indium

Answer: A

Watch Video Solution

261. A p-type semiconductor is obtained by doping silicon with

A. germanium

B. gallium

C. bismuth

D. phosphorus

Answer: B

Watch Video Solution

262. In a p-type semiconductor the acceptor level is situated 60 m eV above the valence band. The maximum wavelength of light required to produce a hole will be [use hc $= 12400 eV \text{Å}]$.

A. $0.207 \times 10^{-5} m$

B. $2.07 \times 10^{-5} m$

C. $20.7 \times 10^{-5} m$

D. $207 \times 10^{-5} m$

Answer: B

Watch Video Solution

263. Which type of semiconductor is obtained by mixing arsenic with silicon?

A. n-type

B. p-type

C. Both

D. None

Answer: A

Watch Video Solution

264. A semiconductor is cooled form T_1K to T_2K. Its resistance

A. will decrease

B. will increase

C. will first decreases then increases

D. will not change

Answer: B

Watch Video Solution

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

A. 0.9

B. 0.7

C. 0.5

D. 1.1

Answer: C

Watch Video Solution

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

A. drift in forward biased, diffusion in reverse bias

B. diffusion in forward biased, drift in reverse bias

C. diffusion in both forward reverse bias

D. drift in both forward and reverse bias

Answer: B

Watch Video Solution

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

A. electric field is zero

B. potential is zero

C. electric field is maximum

D. potential is maximum

Answer: A

Watch Video Solution

268. The electrical resistance of depletion layer is large because

A. it has no charge carriers

B. it has few holes as charge carriers

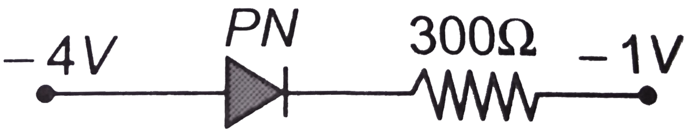
C. it contains few electrons as charge carriers

D. it contains few ion as charge carriers

Answer: A

Watch Video Solution

269. What is the current in the circuit shown below?



A. $10^{-2}A$

B. $10^{-3}A$

C. $1A$

D. zero

Answer: D

Watch Video Solution

270. The built in potential of p-n junction diode is a function of

A. temperature

B. biased voltage

C. doping density

D. all of the above

Answer: D

Watch Video Solution

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

A. 1000

B. 1250

C. 100

D. 5000

Answer: D

Watch Video Solution

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

A. 36

B. 26

C. 16

D. 6

Answer: D

Watch Video Solution

273. A transistor is operated in common emitter configuration at $V_c = 2V$ such that a change in the base current from $100\mu A$ to $200\mu A$ produces a change in the collector current from $5mA$ to $10mA$. The current gain is

A. 100

B. 150

C. 50

D. 75

Answer: C

Watch Video Solution

274. An n-p-n transistor having a.c. current gain of 50 to be used to make to make an amplifier of power gain of 300. What will be the voltage gain of the amplifier?

A. 8.5

B. 6

C. 4

D. 3

Answer: B

Watch Video Solution

275. Choose the corrector relation between the transistor parameters α and β.

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

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

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

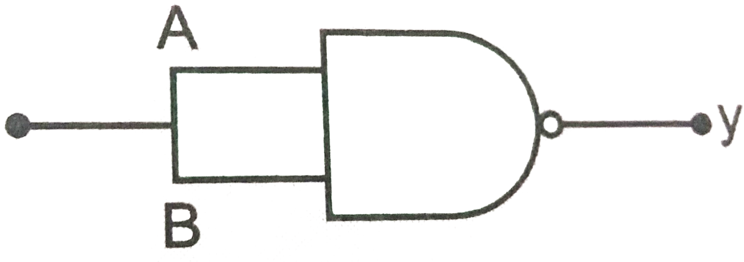
D. $\beta = \frac{\alpha}{1+\alpha}$

Answer: B

Watch Video Solution

Watch Video Solution

276. The abjoining logic symbol is equivalent to



A. OR gate

B. AND gate

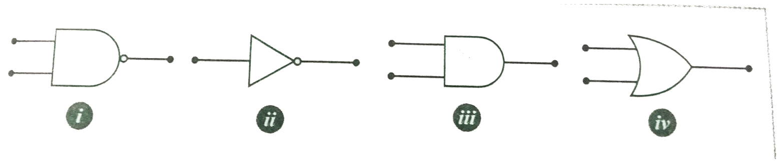
C. NOT gate

D. NAND gate

Answer: C

Watch Video Solution

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



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

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

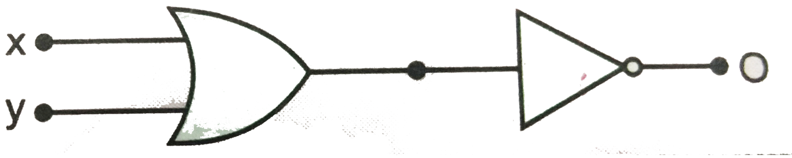
C. (i), (iii), (iv)

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

Answer: B

Watch Video Solution

278. The logic circuit Fig. represents



A. NAND gate with outlet, $O = \overline{X} + \overline{Y}$

B. NOR gate with outlet, $O = \overline{X + Y}$

C. NAND gate with outlat, $O = \overline{X . Y}$

D. NOR gate with outlet, $O = \overline{X} . \overline{Y}$

Answer: B

Watch Video Solution

279. Dicuss how the OR gate is realised from the NAND gate.

A. Only two NAND gates

B. Two NOT gate obtained from NAND gates and one NAND gate

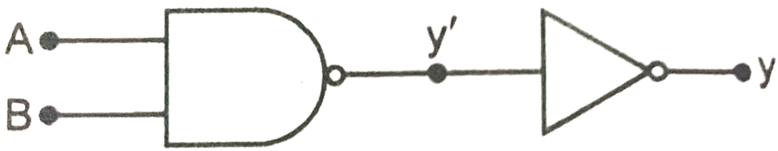
C. Four NAND gates and two AND gates obtained from NAND gates

D. Three NAND gates, i.e., three NOT gates obtained from NAND gates

Answer: B

Watch Video Solution

280. The circuit in Fig.performs the logic function of



A. AND gate

B. NAND gate

C. OR gate

D. XOR gate

Answer: A

Watch Video Solution

281. In Boolean algbra $\overline{A}\,.\,\overline{B}$ rquals

A. $A + B$

B. $\overline{A + B}$

C. A.B

D. $\overline{A} . B$

Answer: B

Watch Video Solution

282. The gate for which output is high, if atleast one input low is

A. NAND

B. NOR

C. AND

D. OR

Answer: A

Watch Video Solution

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

A. 0, 1

B. 1, 0

C. 0, 0

D. 1, 1

Answer: C

Watch Video Solution

Watch Video Solution

284. The semiconductors available in narural form are called............. .

Watch Video Solution

285. The maximum possible energy possessed by free electrons of a material at absolute zero temperature is equal to.......... .

Watch Video Solution

286. In energy band diagram, the energy gap for carbon (diamond)is....... .

Watch Video Solution

287. In.............semiconductor, the fermi level lies in the energy gap, very close to conduction band.

Watch Video Solution

288. In.............semiconductor, the fermi level lies in the energy gap, very close to valence band.

Watch Video Solution

289. In n-type semocionductor, the..........are majority carries and..........are minority carries.

Watch Video Solution

Watch Video Solution

290. In p-type semiconductors, the..........are majority carries and..........are minority carries.

Watch Video Solution

291. Those solids which have high conductivity and low resistivity are called............

Watch Video Solution

292. Those solids which have very low conductivity and very high resistivity are called.........

Watch Video Solution

293. In p-n juction, the physical distance from one side of the barrier to the other is know as the ....barrier and the difference of potential from one side of the barrier to other side is.......known as...........barrier.

Watch Video Solution

294. A p-n junction can be considered to be equivalent to a..........with p and n-regions acting as the plates of a.........and depletion region as the.............

Watch Video Solution

295. In p-n junction, p-side is known as........and n-side is known as..........

Watch Video Solution

296. In germanium p-n diode, the ratio of reverse to forward resistance is..........

Watch Video Solution

297. In p-n junction, there is a ....of majority carriers across the junction in forward biading and..............of charge carriers in reverse biasing.

Watch Video Solution

298. The height of potential barrier in p-n junction diode is.............to temperature in kelvin.

Watch Video Solution

299. For a Transistor, the ratio of change in base-emitter voltage to the resulting change in the base current at constant emitter voltage is called...........

Watch Video Solution

300. In a common emitter a transistor, the ratio of small change in the collector current (ΔI_c) to the corresponding small change in the collector emitter voltage (ΔV_{CE}) at constant base current (I_b) is called...........

Watch Video Solution

301. In common emitter transistor amplifier circuit, the input signal voltage and the output collector voltage are ....phase.

Watch Video Solution

302. The semiconduting devices are more...............than the vacuum tubes. They can withstand..............

Watch Video Solution

303. The base of the decimal number system is..........and the base of binary number system is.............

Watch Video Solution

304. For decimal number 10, the binary representation is...............

Watch Video Solution

305. Convert binary number 10111 into decimal number.

Watch Video Solution

306. A digital circuit which either allows a signal to pass through or stops it, is called a..............

Watch Video Solution

307. The output of an OR gate assumes 1(in level)if..........inputs assume 1 (in level)

Watch Video Solution

308. The output of an AND gate assumes 1 (in level) if ....inputs assume 1(in level)

Watch Video Solution

309. The output of NOT gate is 1(in level) if input is..........

Watch Video Solution

310. If the output of OR gate is used as input of NOT gate, the combination of gates is called the...............

Watch Video Solution

311. The Boolean experssion for NAND gate is............

Watch Video Solution

312. If the output of a gate is $y = \overline{\overline{A. B}}$, then this gate works as............

Watch Video Solution

LONG QUESTION ANSWER

1. How is zener diode fabricated so as to make it a special purpose diode the significance of brekdown votlage explain brielfy with the help of a cirucit diagram how a p-n junction diode works as a half wave rectifier

Watch Video Solution

2. Explain the use of a junction transistor as an oscillator.

Watch Video Solution

PROBLEMS FOR PRACTICE

1. A doped semiconductor has impurity levels 30meV bleow the conduction band,(a)Is the material m-type or p-type? (b)In a thermal collision,and amount kT of energy is given to the extra electron loosely bound to the impurity ion and this electron is just able to jump into the conduction band. Calculate the temperature T.

Watch Video Solution

2. A battery of emf $2V$ is connected across a block of length $0.1m$ and area of cros-section $1 \times 10^{-4} m^2$. If the block is of intrinsic silocon at $300K$, find the electron and hole currents. What will be the magnitude of the total current? What will be the magnitude of the total current if germanium is used instead of silicon?

Given that for Si at $300K$: $\mu_e = 0.135 m^2 V^{-1} s^{-1}$, $\mu_h = 0.048 m^2 V^{-1} s^{-1}$ and intristic carrier concentration $n_i = 1.5 \times 10^{16} m^{-3}$. For Ge at $300K$: $\mu_e = 0.39 m^2 V^{-1} s^{-1}$, $\mu_h = 0.19 m^2 V^{-1} s^{-1}$ and $n_i = 2.4 \times 10^{19} m^{-3}$

Watch Video Solution

3. A potential barrier of $0.7V$ exists across a p-n junction If the depletion layer is $7.0 \times 10^{-7} m$ thick, what is the intensity of the electric filed in this region? If an electron is approaching the p-n junction from the n-side with a speed $6.0 \times 10^5 ms^{-1}$, determine the speed with which it enters the p-side of p-n junction.

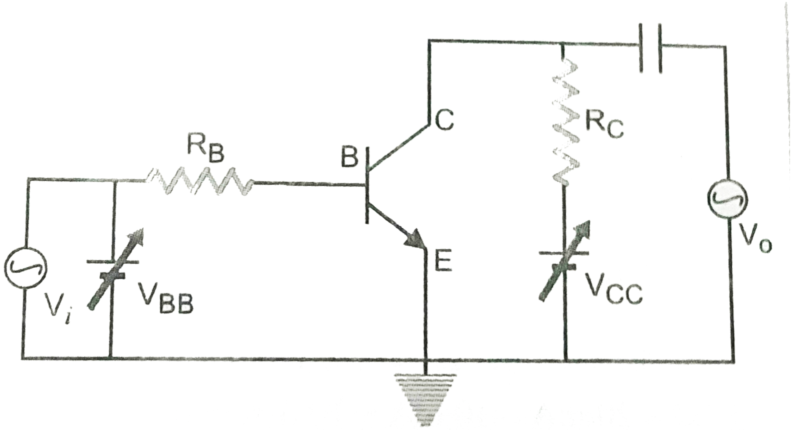
Watch Video Solution

4. The following data was obtained for a given transistor

For this data, calculate the input resistance of the given transistor.

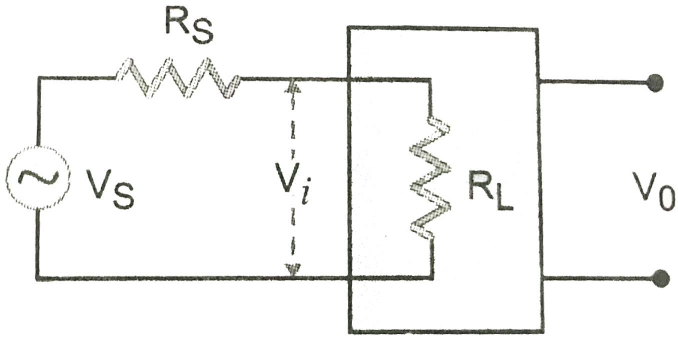
View Text Solution

5. For a CE-transistor amplifier Fig.the audio signal voltage across the collector resistance of $1.0k\Omega$ is $1.0V$. Suppose the current amplification factor of the transistor is 100, what should be the value of R_B in series with $V_{BB} = 0.6V$. Also calculate the voltage drop across the collector resistance.



View Text Solution

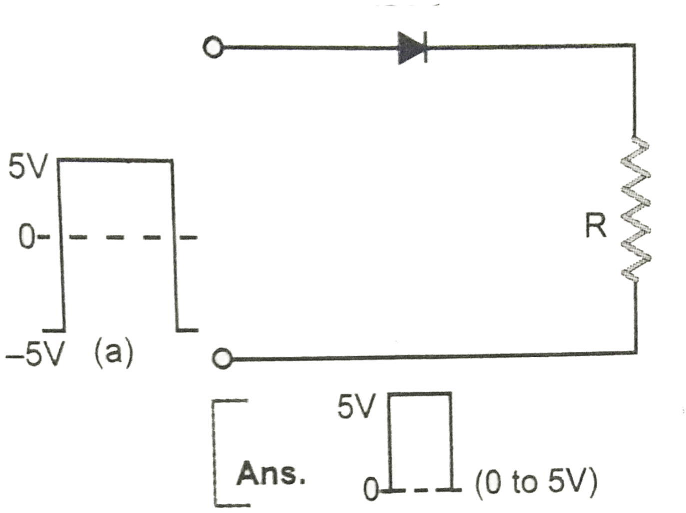
6. An amplifier is represented by the circuit shown in Fig. Here r_i is the input resistance of the amplifier and the voltage V_i is appearing across it. This voltage is amplified by a factor A_V and appears across the load as voltage V_0



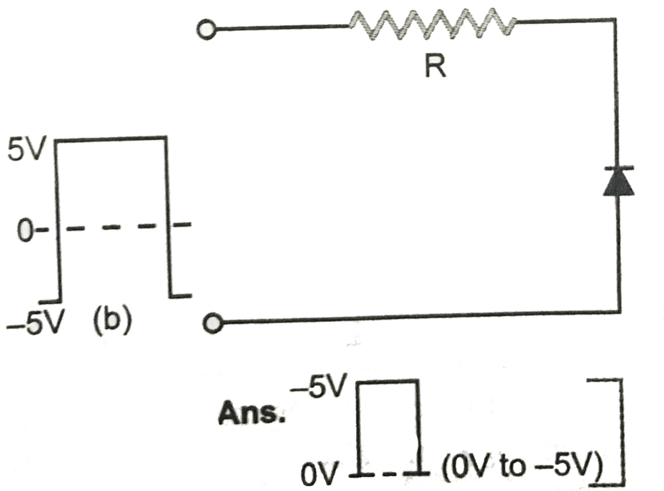
An external voltage V_s is applied at the input terminals of the amplifier via series resistance R_S. What will be the apparent gain $A_V (= V_0 / V_s)$ of the ampilifier in terms of A_V, R_S and r_i.

Watch Video Solution

7. In the following circuit, if the input wave form is as shown in the figure, what will be the wave form (i) across R in Fig. and (ii) across the diode in Fig. Assume that the diode is ideal.



a

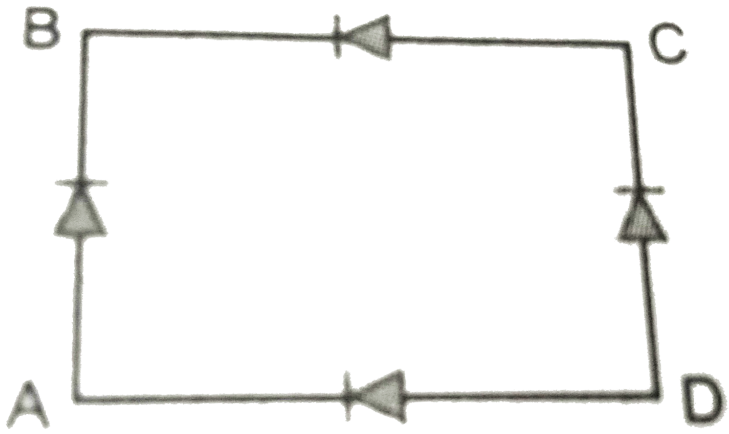


b

Watch Video Solution

MCQ

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



A. OA

B. $10^{-2}A$

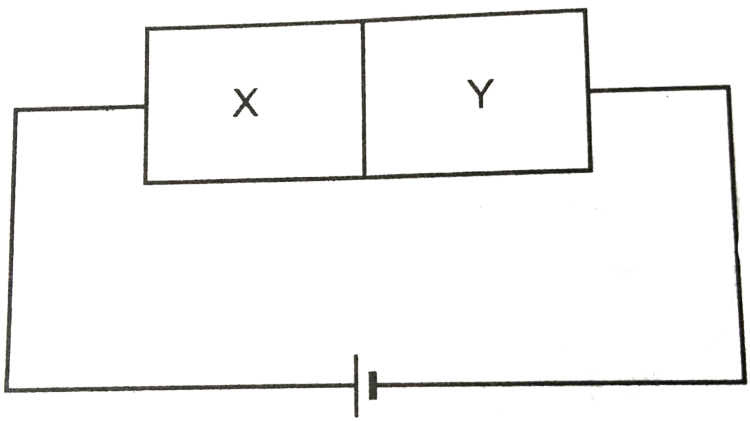
C. $10^{-1}A$

D. $10^{-3}A$

Answer: B

View Text Solution

2. In Fig. the input is across the terminals A and C and the output is across B and D. Then the output is



A. half wave rectified

B. full wave rectified

C. zero

D. same as the input

Answer: B

View Text Solution

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

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

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

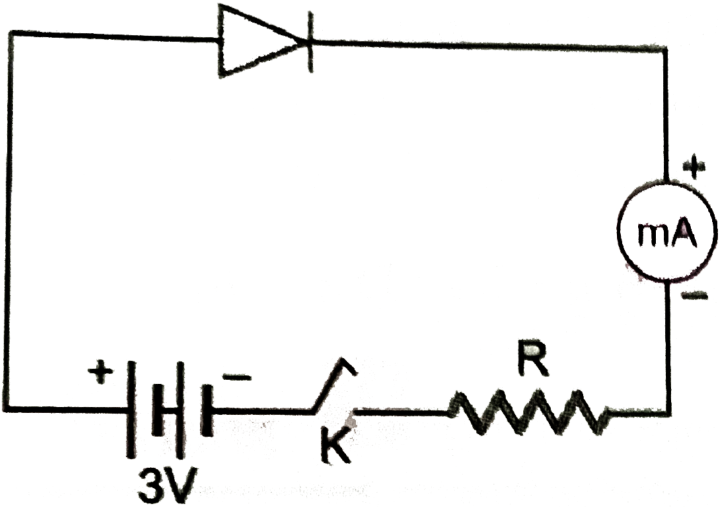
C. 1.5 G

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

Answer: B

Watch Video Solution

4. When a p-type semiconductor is brought into a close contact with n-type semiconductor, we get a p-n junction with a barrier potential $0.4V$ and the width of depletion region is $4.0 \times 10^{-7}m$. this p-n junction is forwaed biased with a battery of voltage $3V$ adn negligible internal resistance, in series with a resistance of resistance R, ideal milliammeter with reading 20 mA and key K as shown in Fig.



The resistance of resistor R is

A. 0.060 W

B. 0.052 W

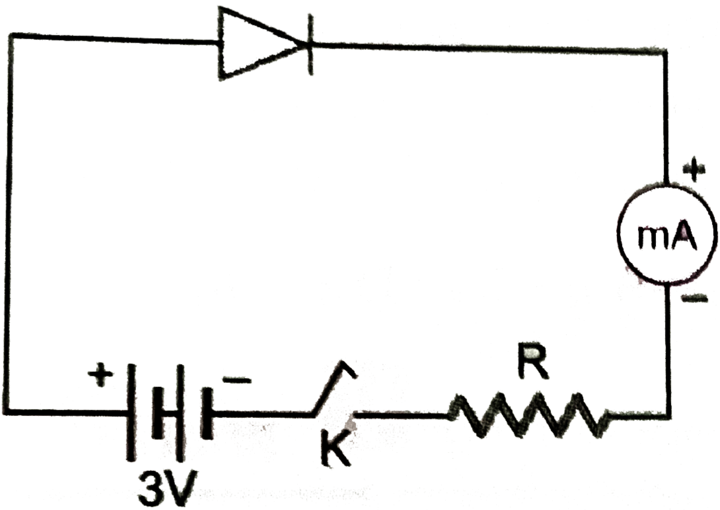
C. 0.008 W

D. 0.048 W

Answer: C

Watch Video Solution

5. When a p-type semiconductor is brought into a close contact with n-type semiconductor, we get a p-n junction with a barrier potential $0.4V$ and the width of depletion region is $4.0 \times 10^{-7} m$. this p-n junction is forwaed biased with a battery of voltage $3V$ adn negligible internal resistance, in series with a resistance of resistance R, ideal milliammeter with reading 20 mA and key K as shown in Fig.



The resistance of resistor R is

A. $1.39 \times 10^{5} ms^{-1}$

B. $2.78 \times 10^5 ms^{-1}$

C. $1.39 \times 10^6 ms^{-1}$

D. $2.78 \times 10^6 ms^{-1}$

Answer: A

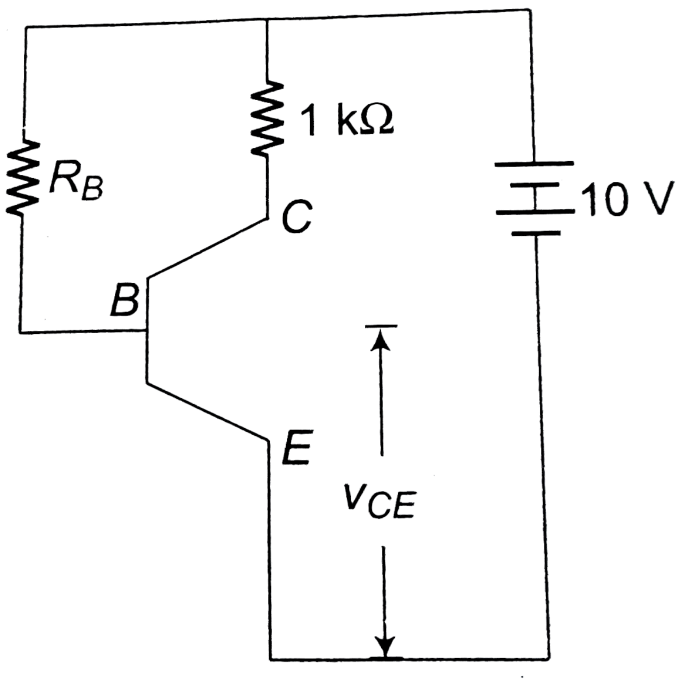
Watch Video Solution

INTEGER TYPE QUESTION

1. The mean free path of conduction electrons in copper is about $4.0 \times 10^{-8} m$. The electric field which can give on the average $2.4 eV$ energy to conduction electron in copper block is $a \times 10^7 Vm^{-1}$. What is the integer value of a?

Watch Video Solution

2. In the cuircuit shown here the transistor used has a current gain $\beta = 100$. What should be the bias resistor R_{BE} so that $V_{CE} = 5V(\text{neglect } V_{BE})$



Watch Video Solution

MULTIPLE CHOICE QUESTIONS

1. 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 npn transistor with R as base

B. It is an pnp transistor with R as collector

C. It is an pnp transistor with R as emitter

D. It is an npn transistor with R as collector

Answer: A

Watch Video Solution

2. The reverse saturation of p-n diode

A. depends on doping concentration

B. depends on diffusion lengths of carriers

C. depends on the doping concentration and diffusion lengths

D. depends on the doping concentration, diffusion length and devise temperature

Answer: D

Watch Video Solution

Fill in the Blanks

1. The fraction (f) of the number of electrons raised from valence band to conduction band at temperature TK in intrinsic semiconductor is given by........

Watch Video Solution