PHYSICS

BOOKS - BINA LIBRARY PHYSICS (ASSAMESE ENGLISH)

ELECTRONIC DEVICES

Example

1. Suppose a pure Si crystal has 5×16^{28} atoms. m^{-3}. It is doped by 1ppm

concentraction of pentabalent As. Calculate the number of electron and holes. Given that $n_i = 1.5 \times 10^{16} m^{-3}$.

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2. A p -n photo diode is fabricated from a semi-conductor with a band gap of 2.8 eV. Can it detect the wavelength of 6000 nm?

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3. The collector current in a transistor changes from 1.5 mA to 3.5 mA when the base current is changed from $20\mu A$ to $60\mu A$. Find the current gain.

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4. In a n-p-n transistor in CE configuration, the collector voltage is 8V.The voltage drop across the load resistance of 800Ω connected in collector circuit is 0.8V. If the current

amplification factor is 25, Calculate emitter voltage.

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5. What is the angle of reflection when a ray of light falls normally on a plane mirror?

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6. Write lens formula

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7. Do interference occur for sound waves?

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8. What is light?

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9. In a transistor, the base current is changed by $20\mu A$. This results in a change of 0.02V in

base emitter voltage and a change of 2mA in the collector current.

.If the transistor is used as an amplifier with load resistance of 5KΩ .Find its voltage gain.

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10. Name a communication device which uses light for its working.

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Exercise

1. What is an energy band?

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2. What is a valence band?

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3. What is a forbidden band?

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4. What is meant by doping?

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5. What is the order of energy gap in a semi-conductor?

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6. How does the conductivity of a semi-conductor change with rise of temperature?

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7. What type of semi conductor is formed when Germanium is doped with indium?

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8. Draw the magnetic field lines of a bar magnet.

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9. Write a short note on "Bar magnet"

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10. State an essential requirement for doping process.

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11. What type of extrinsic semi- conductor is formed when doped with pentavalent impurity?

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12. What are majority charge carries of a n-type semi conductor?

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13. What are holes?

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14. What is depletion region?

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15. What is photoconductivity?

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16. What is breakdown voltage of a Zener diode? Explain its use as a voltage regulator.

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17. Write short notes on the following

Light emitting diode

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18. Name the diode for which output voltage is a regulated voltage.

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19. Why is the base of a transistor thin and low doped?

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20. Define current gain ratio (α) in common base mode.

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21. Define current gain ratio (β) in common emitter node.

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22. State the relation between transistor parameters α and β.

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23. How does the dc current gain of a transistor change, if the width of the base region is increased?

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24. What is meant by active region of a transistor?

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25. What is the phase difference-between velocity and displacement ?

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26. What is a truth table?

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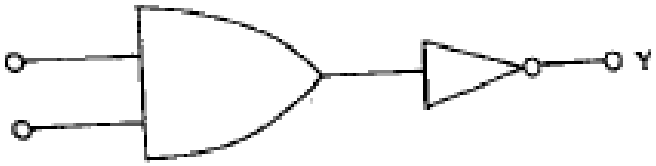
27. Write the truth table for the combination of gates shown.



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28. Write two different uses of concave mirrors

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29. Name the type of mirror which always forms a virtual and diminished image.

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30. Why is convex mirror used as a rearview mirror in vehicles?

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31. If an object is placed at the focus of a concave mirror, where is the image formed?

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32. Write two difference between real and virtual image?

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33. What is a photodiode? Explain its working principle.

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34. What is a solar cell?

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35. The angle between an incident ray and the mirror is 40^{o}. What is the angle of incidence?

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36. The angle between an incident ray and the mirror is 40^{o}. what is the angle of reflection?

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37. The angle between an incident ray and the mirror is 40^{o}. What is the total angle through which the ray of light turns?

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38. Explain the relationship between energy and power.

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39. Distinguish between n type and p type semiconductor.

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40. Draw the diagram to show the energy bands of a n type and p type semiconducotr at T>0K.

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41. With the help of suitable diagram, explain the formation of depletion region in a p-n junction. How does its width change when junction is forward biased

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42. With the help of suitable diagram, explain the formation of depletion region in a p-n junction. How does its width change when junction is forward biased

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43. Why does a convex mirror is said to have a virtual principal focus?

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44. Explain why a ray of light passing through the centre of curvature of a concave mirror gets reflected along the same path after reflection.

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45. Draw circuit diagram to describe the working of a p-n junction as full wave rectifier.

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46. What is LED ? State two advantages of LED over incandescent lamps.

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47. What is breakdown voltage of a Zener diode? Explain its use as a voltage regulator.

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48. What is the nature of the image formed by a concave mirror if the magnification produced by the mirror is + 3?

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49. What is secondary emission?

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50. Which property of concave mirror is utilised for using them as shaving mirrors?

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51. What is NOT gate. Give its truth table.

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52. Draw a OR gate and write its truth table.

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53. What is NOT gate. Give its truth table.

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54. What is semiconductors? Give examples.

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55. Why does a ray of light bend when it travels from one medium into another?

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56. What is lens maker's formula?

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57. What is convex lens ?

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58. Why is the base of a transistor thin and low doped?

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59. Why is common emitter amplifier preferred over common base amplifier?

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60. Why transistor can't be used as a rectifier?

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61. If the base region of a transistor is made large as compared to the usual transistor ,how does it affect current gain of the transistor?

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62. If the base region of a transistor is made large as compared to the usual transistor ,how does it affect current gain of the transistor?

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63. When does static friction come into play ?

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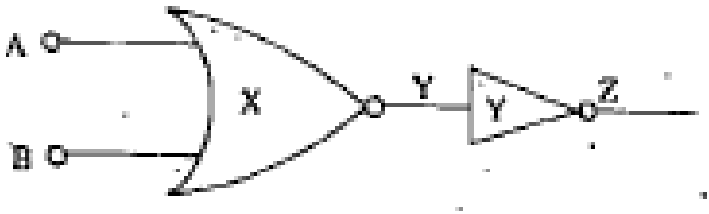
64. Identify the logic gates marked X and Y in the following figure.Write down output Z . When A= 1, B=1 and A=B= 0



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65. Draw a diagram of show how NAND gates can be combined to obtain an OR gate.

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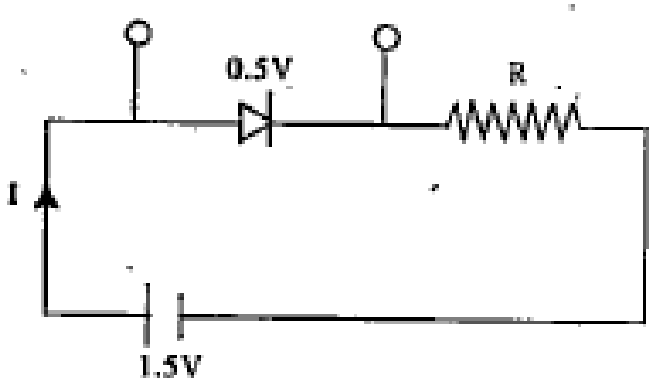

66.

A pn junction diode when forward biased has

a drop of 0.5 V and independent of current flowing trhough it. The maximum bearable current is 10 mA. Calculate the value of R so the current through the circuit is 5 mA.

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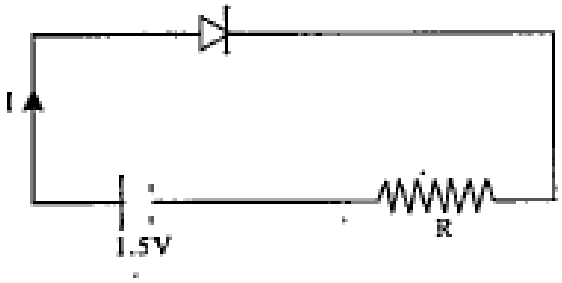
67.



The current flowing through forward biased diode is 20 mA. The emf of the cell is 3V and

the knee voltage is 0.7V. Find the value of wattage R and power consumed across the diode.

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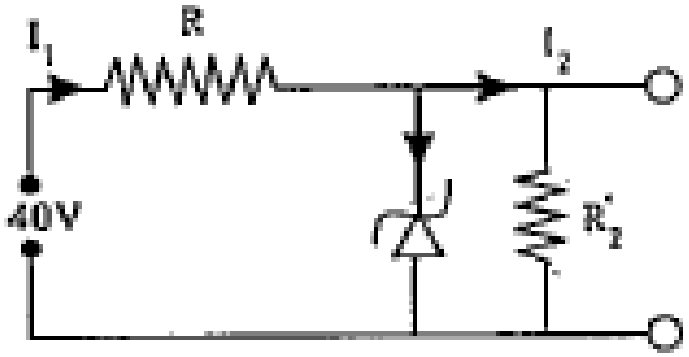
68. A 10v zener diode along with a series resistance is connected across a 40V supply. Calculate the minimum value of the resistance required, if the maximum zener current is 50

mA.



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69. A transistor has α = 0.95 . If the emitter current is 10 mA , what is the collector current ?

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70. A transistor has α = 0.95 . If the emitter current is 10 mA , what is the Base current

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71. A transistor has α = 0.95 . If the emitter current is 10 mA , what is the β?

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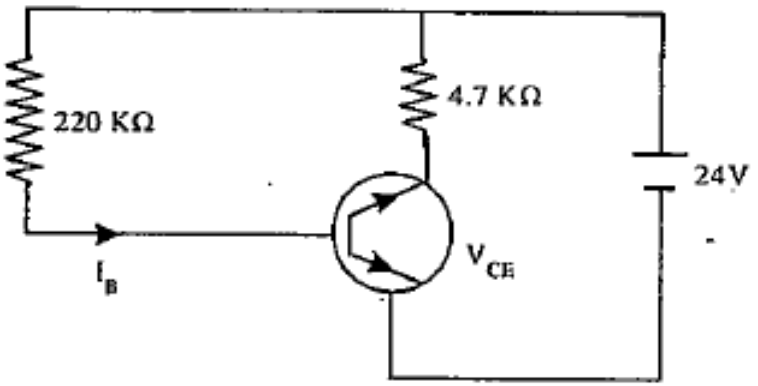

72.

In the above circuit, I_C =1.5 mA and β = 100.Find I_B, V_{CE} and V_{BE}

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73. A transistor has a current gain in CE mode 100. In CE amplifier circuit, the collector

resistance is 2 KΩ and input resistance 500Ω .Find the voltage gain if input voltage is 0.01 V.

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74. In an n p n transistor circuit, the collector current is 15 mA. If 95% of the electron emitted reach the collector, what is the base current?

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

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76. What is concave lens ?

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77. A change of 0.2 mA in the base current causes a 5 mA in the the collector current of common emitter amplifier.

i) Find the ac current gain of the transistor

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78. A change of 0.2 mA in the base current causes a 5 mA in the the collector current of common emitter amplifier.

ii) If the input resistance is 2KΩ and its

voltage gain is 75, calculate the load resistance used in the circuit.

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79. The input resistance of a silicon transistor is 100 Ω. Base current is changed by 40μA which results in a change in collector current by 2 mA. This transistor is used as a common emitter amplifier with a load resistance of 4K Ω. Find the voltage gain of the amplifier.

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80. The input resistance of a Silica transistor is 665Ω. Its base current is changed by $15\mu A$ which results 2mA in the change of collector current of 5 KΩ, calculate

ii) Transconductance .

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81. The input resistance of a Silica transistor is 665Ω. Its base current is changed by $15\mu A$ which results 2 mA in the change of collector

current of 5 KΩ, calculate

iii) Voltage gain of the transistor.

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82. When a semi - conductor is continuously heated its resistance

A. increase

B. decrease

C. remains unchanged

D. first increase, then decreases.

Answer: B

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83. The potential barrier in the depletion layer is due to

A. ions

B. electrons

C. holes

D. forbidden band

Answer: A

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84. What is a p-n junction diode?

A. diode design

B. temperature

C. forward bias

D. doping density

Answer: A

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85. The least doped region in a transistor is

A. emitter

B. collector

C. base

D. either emitter or collector

Answer: C

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86. In a germanium sample, traces of gallium are added as an impurity.The resultant sample would behave like

A. a conductor

B. as insulator

C. a p- type semi conductor

D. an n- type semi conductor.

Answer: C

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87. On increasing current in a semi - conductor diode, the contact potential will.

A. increase

B. decrease

C. become zero

D. remains same

Answer: B

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88. In a full wave rectifier with input frequency 50 Hz, the ripple in the output is mainly of the frequency (in Hz).

A. 25

B. 50

C. 100

D. none of these

Answer: C

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89. A p- type semi conductor is

A. Positively charged

B. uncharged

C. negatively charged

D. none of the above

Answer: B

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90. Zener diode is used as

A. an amplifier

B. a rectifier

C. an oscillator

D. a voltage regulator

Answer: D

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91. a n-p-n transistor conducts when

A. collector is positive and emitter is negative w.r.t base

B. collector is positive and emitter is at same potential as the base

C. both collector and emitter are positive w.r.t base.

D. both collector and emitter are negative w.r.t base.

Answer: A

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92. To obtain p- type germanium semi conductor, it must be doped with

A. arsenic

B. antimony

C. indium

D. phosphorus

Answer: C

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93. When arsenic is added as an imparity to silicon the resulting material is

A. n-type semi- conductor

B. p-type semi conductor

C. n-type conductor

D. none of these

Answer: A

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94. Holes are charge carries in

A. intrinsic semi conductor

B. p-type semi conductor

C. ionic solids

D. metals

Answer: A::B

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95. A n-type semi - conductor is

A. negatively charged

B. positively charged

C. neutral

D. negatively or positively charged depending upon the impurity.

Answer: C

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96. A hole in a p- type semi conductor is

A. an excess electron

B. a missing electron

C. a missing atom

D. a donor level

Answer: B

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97. On increasing the reverse biased voltage to a large value in a p-n junction diode current

A. increases slowly

B. increases sharply

C. decreases slowly

D. remains fixed

Answer: B

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98. The depletion layer in the p-n junction region is caused by

A. diffusion of carriers

B. increases sharply

C. drift of holes

D. migration of impurity ions

Answer: A

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99. In a p-n junction diode at high value of reverse bias the current rises sharply. The value of reverse bias is known as

A. cut off voltage

B. Zener voltage

C. increase voltage

D. critical voltage

Answer: B

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100. A p-n junction diode can be used as

A. rectifier

B. amplifier

C. modulator

D. demodulator

Answer: A

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101. When n-p-n transistor is used as an amplifier

A. electrons move from base to emitter

B. electrons move from emitter to base

C. electrons move from collector to base

D. holes move from base to emitter

Answer: B

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102. What is the relation between α and β ?

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

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

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

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

Answer: D

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103. Two NOT gates are connected at the two inputs of a NAND gate. The combination behaves as

A. NAND gate

B. AND gate

C. OR gate

D. NOR gate

Answer: C

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104. NAND gate is

A. a basic gate

B. a universal gate

C. a basic universal gate

D. only an input logic gate

Answer: B

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105. The adjoining truth table represents

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

A. AND gate

B. NOR gate

C. OR gate

D. NAND gate

Answer: A

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106. An AND gate can be prepared by repetitive use of

A. NOT gate

B. NOR gate

C. NAND gate

D. OR gate

Answer: C

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107. Boolean algebra is essentially based on

A. logic

B. truth

C. numbers

D. symbol

Answer: A

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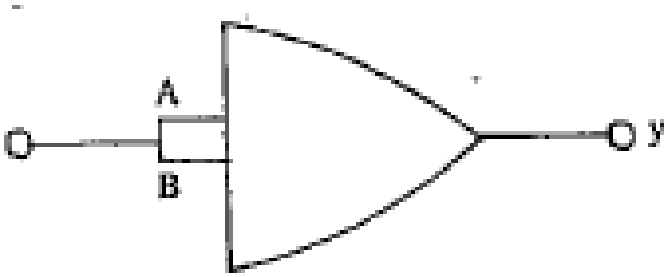
108. The symbol shown below represens



A. NOT gate

B. OR gate

C. AND gate

D. NOR gate

Answer: A

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