PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

SEMICONDUCTOR

Physics

1. A npn transistor conducts when

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

B. collector is positive and emitter is negative with respect to the base

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

D. both collector and emitter are negative with respect to the base

Answer:

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2. In the case of constant α and β of a transistor

A. $\alpha = \beta$

B. $\beta < 1, \alpha > 1$

C. $\alpha = \beta^2$

D. $\beta > 1, \alpha < 1$

Answer:

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3. In an NPN transistor 10^{10} electrons enter the emitter in 10^{-6}s and 2 % electrons recombine with holes in base then current gain α and β are

A. $\alpha = 0.98, \beta = 49$

B. $\alpha = 49, \beta = 0.98$

C. $\alpha = 0.49, \beta = 98$

D. $\alpha = 98, \beta = 0.49$

Answer:

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4. If l_1, l_2, l_3 are the lengths of the emitter, base and collector of a transistor then

A. $1_1 = 1_2 = 1_3$

B. $1_3 < 1_2 > 1_1$

C. $1_3 < 1_1 < 1_2$

D. $1_3 > 1_1 > 1_2$

Answer:

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5. In an NPN transistor the collector current is $10mA$. If $90\,\%$ of electrons reach collector, the emitter current (i_E) and base current (i_B) are given by

A. $i_E = -1mA, i_B = 9mA$

B. $i_E = 9mA, i_B = -1mA$

C. $i_E = 1mA, i_B = 11mA$

D. $i_E = 11mA, i_B = 1mA$

Answer:

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6. The transfer ration of a transistor is 50. The input resistance of the transistor when used in the common -emitter configuration is $1k\Omega$. The peak value for an $A.C.$ input voltage of $0.01V$ peak is

A. $100\mu A$

B. $0.01mA$

C. $0.25mA$

D. $500\mu A$

Answer:

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

A. 6 mA

B. 4.8 mA

C. 24 mA

D. 8 mA

Answer:

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8. In NPN transistor the collector current is $10mA$. If 90% of electrons emitted reach the collector, the

A. emitter current will be 9 mA

B. emitter current will be 11.1 mA

C. base current will be 0.1 mA

D. base current will be 0.01 mA

Answer:

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

A. α

B. β / α

C. $\beta\alpha$

D. β

Answer:

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10. The following truth table corresponds to the logic gate

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

A. NAND

B. OR

C. AND

D. XOR

Answer:

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11. The truth table shown in figure is for

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

A. XOR

B. AND

C. XNOR

D. OR

Answer:

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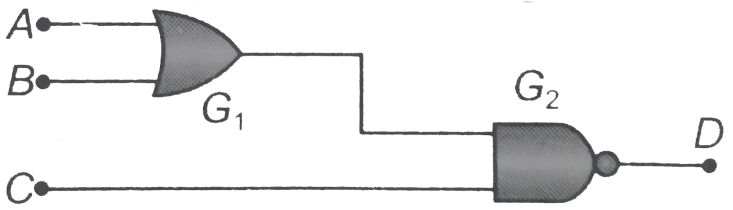
12. For the given combination of gates, if the logic states of inputs $A, B, C,$ are as follows $A = B = C = 0$ and $A = B = 1, C = 0$ then the logic states of output D are



A. 0,0

B. 0,1

C. 1,0

D. 1,1

Answer:

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13. The logic behind $'NOR'$ gate is that it gives

A. high output when both the inputs are low

B. low output when both the inputs are low

C. high output when both the inputs are high

D. None of these

Answer:

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14. A gate has the following truth table

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

The gate is

A. NOR

B. OR

C. NAND

D. AND

Answer:

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

A. 0,0

B. 0,1

C. 1,0

D. 1,1

Answer:

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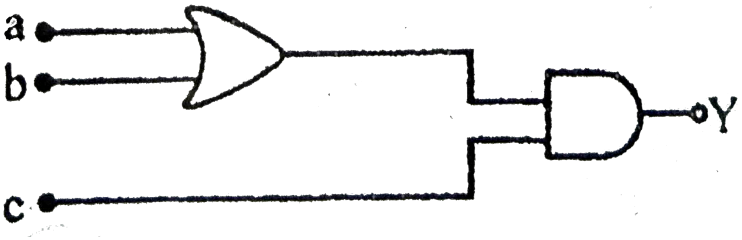
16. To get an output of 1 form the circuit shown in figure the input must be :-



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

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

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

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

Answer:

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17. The truth-table given below is for which gate?

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

A. XOR

B. OR

C. AND

D. NAND

Answer:

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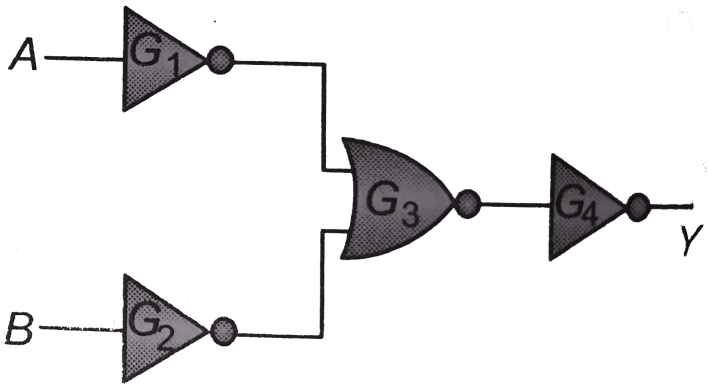
18. The combination of gates shown below produces



A. AND gate

B. XOR gate

C. NOR gate

D. NAND gate

Answer:

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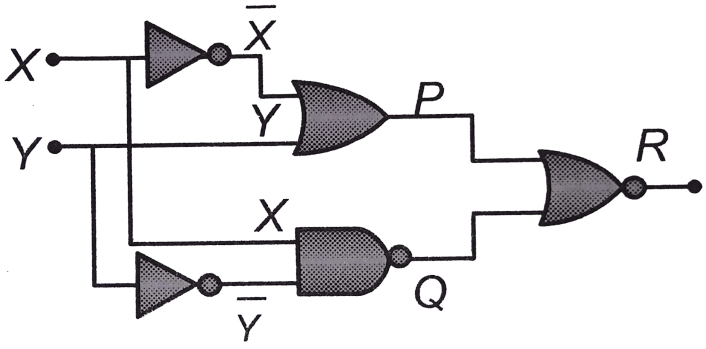
19. Figure gives a system of logic gates. From the study of truth table it can be found that no produce a high output (1) at R, we must have



A. $X = 0, Y = 1$

B. $X = 1, Y = 1$

C. $X = 1, Y = 0$

D. $X = 0, Y = 0$

Answer:

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20. For a transistor $\frac{I_C}{I_E} = 0.96$, then current gain for common emitter configuration

A. 6

B. 48

C. 24

D. 12

Answer:

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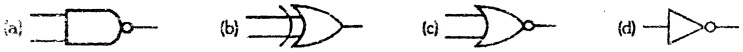
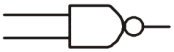
21. Given below are symbols for some logic gates :-

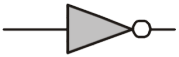


The XOR gate and NOR gate respectively are :-

A. (1) 

B. (2) 

C. (3) 

D. (4) 

Answer:

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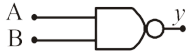
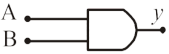
22. Given below are four logic gates symbol (figure). Those for OR, NOR and NAND are respectively

A. (1) 

B. (2) 

C. (3) 

D. (4) 

Answer:

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23. Assertion: The logic gate NOT can be built using diode.

Reason: The output voltage and the input voltage of the diode have 180° phase difference.

A. Statement-1 is True, Statement-2 is True , Statement-2 is a correct explanation for Statement-3

B. Statement-1 is True, Statement-2 is True , Statement-2 is NOT a correct explanation

for Statement-3

C. Statement-1 is False, Statement-2 is True

D. Statement-1 is True, Statement-2 is True , Statement-2 is a correct explanation for Statement-3

Answer:

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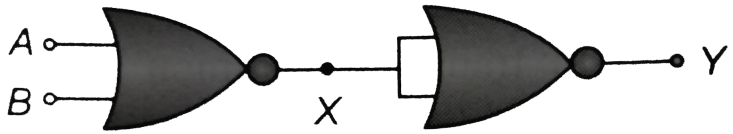
24. Assertion: The following circuit represents $'OR'$ gate



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

A. Statement-1 is True, Statement-2 is True , Statement-2 is a correct explanation for Statement-4

B. Statement-1 is True, Statement-2 is True , Statement-2 is NOT a correct explanation for Statement-4

C. Statement-1 is False, Statement-2 is True

D. Statement-1 is True, Statement-2 is True , Statement-2 is a correct explanation for Statement-4

Answer:

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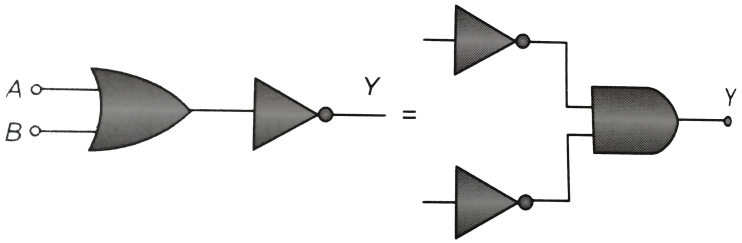
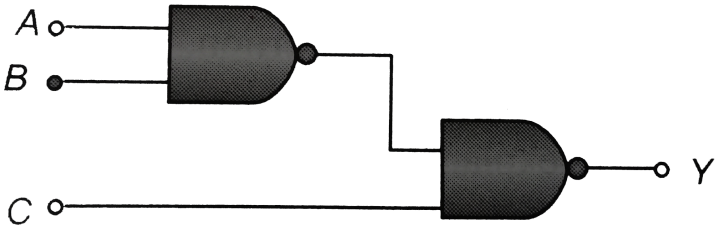
25. Assertion: De Morgan's theoram $\overline{A+B} = \overline{A}.\overline{B}$ may be explained by the following circuit.



Reason: In the following circuit, for output, inputs ABC are 101.



A. Statement-1 is True, Statement-2 is True , Statement-2 is a correct explanation for Statement-5

B. Statement-1 is True, Statement-2 is True , Statement-2 is NOT a correct explanation for Statement-5

C. Statement-1 is False, Statement-2 is True

D. Statement-1 is True, Statement-2 is True , Statement-2 is a correct explanation for Statement-5

Answer:

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26. When a semiconductor is heated, its resistance

A. decreases

B. increases

C. reamins unchanged

D. nothing is definite

Answer:

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27. The energy band gap of Si is

A. 0.70 eV

B. 1.1 eV

C. between 0.70 eV to 1.1eV

D. 5 eV

Answer:

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28. 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. $EG_1 = EG_2 = EG_3$

B. $EG_1 < EG_2 > EG_3$

C. $EG_1 > EG_2 > EG_3$

D. $EG_1 < EG_2 > EG_3$

Answer:

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29. Let n_p and n_e be the number of holes and conduction electrons respectively in a semiconductor. Then

A. $n_h > n_e$"in an intrinsic semiconductor"

B. $n_h = n_e$"in an extrinsic semiconductor"

C. $n_h = n_e$"in an intrinsic semiconductor"

D. $n_e > n_h$"in an intrinsic semiconductor"

Answer:

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30. Which statement is correct?

A. N-type germanium is negatively charged and P-type germanium is positively charged

B. Both N-type and P-type germanium are neutral

C. N-type germanium is positively charged and P-type germanium is negatively charged

D. Both N-type and P-type germanium are negatively charged

Answer:

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31. Wires P and Q have the same resistance at ordinary (room) temperature. When heated, resistance of P increases and that of Q decreases. We conclude that

A. P and Q are conductors of different materials

B. P is n-type semiconductor and Q is p-type semiconductor

C. P is semiconductor and Q is conductor

D. P is conductor and Q is semiconductor

Answer:

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32. In extrinsic P and N - type, semiconductor materials, the ratio of the impurity atoms to the pure semiconductor atoms is about

A. 1

B. 10^{-1}

C. 10^{-4}

D. 10^{-7}

Answer:

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33. At zero Kelvin a piece of germanium

A. becomes semiconductor

B. becomes good conductor

C. becomes bad conductor

D. has maximum conductivity

Answer:

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34. Electronical configuration of germenium is $2, 8, 18$ and 4. To make it extrinsic semiconductor small quantity of antimony is added

A. The material obtained will be N-type germanium in which electrons and holes are equal in number

B. The material obtained will be P-type germanium

C. The material obtanied will be N-type germanium which has more electrons than holes at room temperature

D. The material obtained will be N-type germanium which has less electrons than holes at room temperature

Answer:

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35. The intrinsic semiconductor becomes an insulator at

A. $0^\circ C$

B. $-100^\circ C$

C. 300K

D. 0K

Answer:

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36. Energy band in solids are a consequence of

A. Ohm's Law

B. Pauli's exclusion principle

C. Bohr's theory

D. Heisenberg's uncertainty principle

Answer:

37. In energy band diagram, the energy gap for carbon (diamond)is..... .

A. 1ev

B. 2ev

C. 4 ev

D. 6 ev

Answer:

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38. The valence band and conduction band of a solid overlap at low temperature, the solid may be

A. metal

B. semiconductor

C. insulator

D. None of these

Answer:

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39. Choose the correct statement

A. When we heat a semiconductor its resistance increases

B. When we heat a semiconductor its resistance decreases

C. When we cool a semiconductor to 0 K then it becomes super conductor

D. Resistance of a semiconductor is independent of temperature

Answer:

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40. If n_e and n_h be the number of electrons and drift velocity in a semiconductor. When the temperature is increased

A. n_e increases and v_d $decreases$

B. n_e increases and v_d incereases

C. Both n_e and v_d increases

D. Both n_e and v_d decreases

Answer:

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41. The reverse biasing in a PN junction diode

A. decreases the potential barrier

B. increases the potential barrier

C. increases the number of minority charge carriers

D. increases the number of majority charge carriers

Answer:

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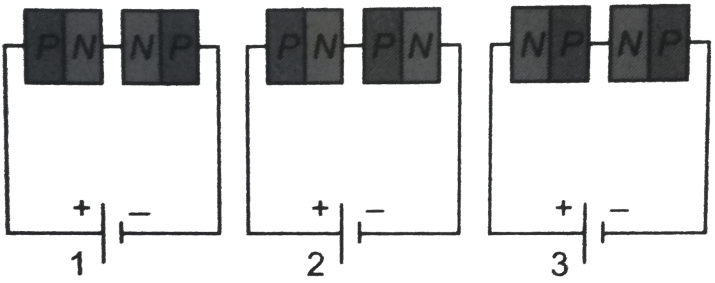
42. Two PN-junction can be connected in series by three different methods as shown in the figure. If the potential difference in the junction is the same, then the correct

connection will be



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

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

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

D. Only in the circuit (1)

Answer:

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43. The approximate ratio of resistance in the forward and reverse biase of the $PN-$ junction diode is

A. $10^2:1$

B. $10^{-2}:1$

C. $1:10^{-4}$

D. $1:10^4$

Answer:

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

A. Drift in forward bias, diffusion in reverse bias

B. Diffusion in forward bias, drift in reverse bias

C. Diffusion in both forward and reverse bias

D. Drift in both forward and reverse bias

Answer:

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45. In a triclinic crystal system

A. $a \neq b \neq c, \alpha \neq \beta \neq \gamma$

B. $a = b = c, \alpha \neq \beta \neq \gamma$

C. $a \neq b \neq c, \alpha \neq \beta = \gamma$

D. $a = b = c, \alpha = \beta = \gamma$

Answer:

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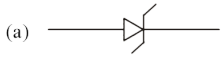
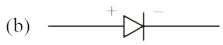
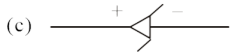
46. The correct cymbol for zener diode is

A. 

B. 

C. 

D. 

Answer:

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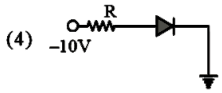
47. In the given figure, which of the diodes are forward biased?

A. ` (##DPP_PHY_57_E01_022_O01.png" width="30%">

B. ` (##DPP_PHY_57_E01_022_O02.png" width="30%">

C. ` (##DPP_PHY_57_E01_022_O03.png" width="30%">

D. 

Answer:

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48. Which of the following materials are crystalline?

A. Copper

B. Sodium chloride

C. Diamond

D. Wood

Answer:

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49. A piece of copper and the other of germanium are cooled from the room temperature to 80 K, then which of the following would be wrong statements?

A. Resistance of each increases

B. Resistance of each decreases

C. Resistance of copper increases while that of germanium decreases

D. Resistance of copper decreases while that of germanium increases

Answer:

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50. Assertion: The number of electrons in a p-type silicon semiconductor is less than the number of electrons ina pure silicon semiconductor at room temperature.

Reason: It is due to law of mass action.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation

for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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51. Assertion: The resistivity of a semiconductor increases with temperature.

Reason: The atoms of a semiconductor vibrate with larger amplitude at higher temperature therby increasing it resistivity.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation

for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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52. Assertion: We can measure the potential barrier of a PN junction by putting a sensitive voltmeter across its terminals.

Reason: The current through the PN junction is not same in forward and reversed bias.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation

for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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