

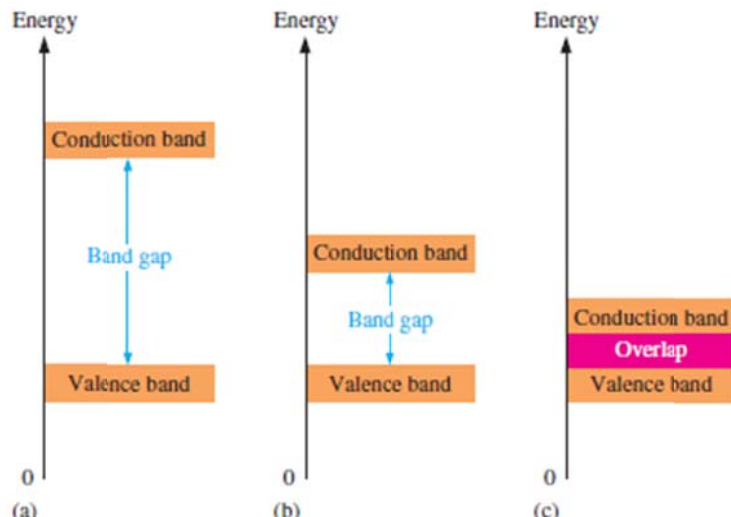
Electronic Circuits – Tutorial 01

Introduction to Electronics

| # | Question | Answer |
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| 1 | Valence electrons are (a) in the closest orbit to the nucleus (b) in the most distant orbit from the nucleus (c) in various orbits around the nucleus (d) not associated with a particular atom | b |
| 2 | A positive ion is formed when (a) a valence electron breaks away from the atom (b) there are more holes than electrons in the outer orbit (c) two atoms bond together (d) an atom gains an extra valence electron | a |
| 3 | In a semiconductor crystal, the atoms are held together by (a) the interaction of valence electrons (b) forces of attraction (c) covalent bonds (d) answers (a), (b), and (c) | d |
| 4 | The atomic number of silicon is (a) 8 (b) 2 (c) 4 (d) 14 | d |
| 5 | Electron-hole pairs are produced by (a) recombination (b) thermal energy (c) ionization (d) doping | b |
| 6 | Recombination is when (a) an electron falls into a hole (b) a positive and a negative ion bond together (c) a valence electron becomes a conduction electron (d) a crystal is formed | a |
| 7 | A trivalent impurity is added to silicon to create (a) germanium (b) a <i>p</i> -type semiconductor (c) an <i>n</i> -type semiconductor (d) a depletion region | b |
| 8 | The purpose of a pentavalent impurity is to (a) reduce the conductivity of silicon (b) increase the number of holes (c) increase the number of free electrons (d) create minority carriers | c |
| 9 | The depletion region is created by (a) ionization (b) diffusion (c) recombination (d) answers (a), (b), and (c) | d |
| 10 | The depletion region consists of (a) nothing but minority carriers (b) positive and negative ions (c) no majority carriers (d) answers (b) and (c) | d |

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| Q1 | If the atomic number of a neutral atom is 6, how many electrons does the atom have? How many protons? |
| Sol 1 | 6 electrons; 6 protons |

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| Q2 | What is the maximum number of electrons that can exist in the 3rd shell of an atom? |
| Sol 2 | 18 |

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| Q3 | <p>For each of the energy diagrams in Figure 1–21, determine the class of material based on relative comparisons.</p>  |
| Sol 3 | <p>A: isolator B: semi conductor C: conductor</p> |

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| Q4 | What happens when heat is added to silicon? |
| Sol 4 | Electrons leave valance band to conduction band |

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| Q5 | Describe the process of doping and explain how it alters the atomic structure of silicon. |
| Sol 5 | Doping is adding pentavalent atom to silicon to become n-type or adding trivalent atom to silicon to become p-type. |

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| Q6 | Because of its barrier potential, can a diode be used as a voltage source? Explain |
| Sol 6 | No. The barrier potential is a voltage drop |