Test Bank - Chapter 01

Q1: Power is defined as

A. the measure of mechanical energy.
B. the potential energy due to gravity.
C. the rate at which work is performed. (Correct)
D. the speed of atomic and molecular motion.

Rationale: Power is a measure of the rate at which work is being performed. The formula P = W/J, where W = watts and 1 watt is equal to 1 J/s, expresses this. Joules are the international standard for expressing energy and work.

Q2: Work is said to be performed when

A. an effort causes a change in the position of matter. (Correct)
B. the amount of energy is measured joules.
C. mechanical power is generated.
D. the law of the conservation of energy is demonstrated.

Rationale: Work is performed only when effort or outside forces produce a change in the position of matter.

Q3: The unit used to express the force of 1 N acting on a 1-kg object to move it 1 m is which of the following?

A. Watt
B. Joule (Correct)
C. Kilowatt
D. Kinetic energy (KE)

Rationale: One joule is equal to the force of 1 N acting on 1 kg. A watt is equivalent to 1 J/s. A kilowatt is simply 1000 W. KE is energy an object possesses when it is in motion.

Q4: Power is expressed in which of the following units?

A. Newtons
B. Joules
C. Ohms
D. Watts (Correct)

Rationale: Power is a measure of the rate at which work is being performed. Energy and work are measured in joules. One joule is the force of 1 N acting on a 1-kg object to move it 1 m. Ohms is the resistance an electrical circuit possesses.

Q5: The energy of a moving object is called

A. sound.
B. kinetic. (Correct)
C. thermal.
D. potential.

Rationale: KE is the energy an object possesses when it stays in motion. Potential energy is stored energy, and it exists in many forms such as thermal energy or sound waves.

Q6: If the velocity of an object is reduced by half, its KE will be which of the following?

A. Reduced to one-eighth (Correct)
B. Increased twofold
C. Reduced twofold
D. Not changed

Rationale: Kinetic energy = 1/2(mass of object x square of velocity it is traveling, or mv2) or KE = 1/2(V x V). If the velocity is reduced by half, then KE = 1/2(1/2V x 1/2V), or 1/2(1/2) = 1/8 reduction.

Q7: Energy that is stored in an object due to its position is known as

A. kinetic energy
B. potential energy (Correct)
C. chemical energy
D. mechanical energy

Rationale: Energy that is stored or possessed by an object because of its position is called potential energy. Mechanical energy can be divided into either KE or potential energy. Chemical potential energy often refers to the bonds in petroleum oils that, if broken, can be converted to KE.

Q8: The potential energy of a compressed spring is known as which of the following?

A. Gravitational
B. Chemical
C. Inelastic
D. Elastic (Correct)

Rationale: The potential energy stored in a compressed spring is called elastic potential energy. This energy is released when the spring is allowed to uncoil. Gravitational potential energy is the energy an object possesses if it is held above any surface, energy that the object's weight gains as it falls. Chemical potential energy resides in the chemical bonds of the atoms that make up the object. Inelastic potential energy would not apply once the spring is compressed.

Q9: The energy stored in heating oil is known as which of the following?

A. Elastic
B. Atomic
C. Chemical (Correct)

D. Gravitational

Rationale: Petroleum reserves of coal, oil, and gas represent chemical potential energy by virtue of the chemical bond that must be broken to release energy. Heating oil potential energy has chemical-to-chemical bonds. Atomic energy involves two processes—fission (splitting atoms) and fusion (joining two atoms).

Q10: According to the kinetic theory of matter

A. all matter is composed of tiny particles.
B. elements combine in fixed proportions to form molecules.
C. falling objects gain energy due to gravity.
D. atoms and molecules are in constant motion. (Correct)

Rationale: KE is the energy an object possesses while in motion.

Q11: What is the correct order from smallest to largest in matter classification?

A. Atoms, molecules, mixtures, compounds, elements
B. Atoms, elements, molecules, compounds, mixtures (Correct)
C. Elements, atoms, molecules, compounds, mixtures
D. Atoms, elements, mixtures, molecules, compounds

Rationale: All matter, whether in gas, liquid, or solid form, is made up of atoms that can combine to form elements; the elements can then combine to form molecules. Molecules can combine to form compounds. Combining compounds makes a mixture.

Q12: Atoms and molecules arranged in an orderly fashion are called

A. solids.
B. mixtures.
C. crystalline. (Correct)
D. amorphous.

Rationale: Crystalline solids are highly organized structures whose atoms and molecules are arranged in a lattice configuration. Amorphous solids have atoms and molecules that are less rigidly arranged.

Q13: The most potential energy is contained by which state of matter?

A. Gases
B. Solids (Correct)
C. Liquids
D. Mixtures

Rationale: Of all states of matter, solids contain the most potential energy; solids are followed by liquids and then gases.

Q14: Supercooled liquids are also known as which of the following?

A. Elements
B. Compounds
C. Crystalline solids
D. Amorphous solids (Correct)

Rationale: Amorphous solids are sometimes called supercooled liquids. Elements and compounds alone can combine to form either crystalline or amorphous solids.

Q15: Which of the following has the least kinetic energy?

A. Air
B. Iron (Correct)
C. Water
D. Plastic

Rationale: Of the three states of matter, solids possess the least amount of KE. The bonds holding their atoms together limit the mobility of the particles that make up the solid.

Q16: Which substance has the weakest cohesive forces?

A. Water
B. Plastic
C. Hydrogen (Correct)
D. Liquid oxygen

Rationale: Gases have extremely weak or no cohesive forces between their atoms. Hydrogen is the only gas among the four choices.

Q17: What forces must be overcome for evaporation to occur? 1. The mass attraction of the molecules for each other 2. The pressure of the gas above the liquid 3. The decrease of KE 4. The pressure of the gas below the liquid

A. 1 and 4
B. 1 and 2 (Correct)
C. 2 and 3
D. 3 and 4

Rationale: Two forces must be overcome for evaporation to occur: the mass attraction of the molecules for each other (i.e., dipole–dipole interactions, hydrogen bonding, and Van der Waals forces) and the pressure of the gas above the liquid.

Q18: The process whereby a solid directly becomes a gas is known as

A. latent heat.
B. sublimation. (Correct)
C. evaporation.

D. condensation.

Rationale: The direct change of state from solid to gas is called sublimation. Evaporation involves change from liquid to gas. Latent heat involves a change of state in matter of any form.

Q19: What increases the rate of evaporation? 1. Decrease the temperature of the liquid 2. Increase the temperature of the liquid 3. Decrease atmospheric pressure 4. Increase atmospheric pressure

A. 1 and 3
B. 1 and 4
C. 2 and 3 (Correct)
D. 2 and 4

Rationale: The rate of evaporation increases with an increase in temperature, an increase in surface area, or a decrease in pressure.

Q20: What pressure is required to maintain equilibrium between liquid and gaseous oxygen at its critical temperature?

A. 1 atm
B. 37 atm
C. 43.9 atm
D. 49.7 atm (Correct)

Rationale: When the atmospheric pressure is maintained at 49.7 atm, at a temperature of –119°C (oxygen's critical temperature), oxygen maintains an equal balance between its liquid and gaseous states.

Q21: The temperature above which gas molecules cannot be converted back to a liquid, no matter how much pressure is exerted, is known as which of the following?

A. Critical temperature (Correct)
B. Critical point
C. Boiling point
D. Latent heat

Rationale: This is the definition of critical temperature.

Q22: The boiling point of liquid oxygen is which of the following?

A. –119°C
B. 182°F
C. –183°C (Correct)
D. 49.7°C

Rationale: This is the boiling point of liquid oxygen.

Q23: Absolute zero is which of the following?

A. 0°K (Correct)
B. The freezing point of water
C. Routinely measured in Fahrenheit
D. The temperature at which all molecular motion stops

Rationale: On the Kelvin scale, 0°K is absolute zero.

Q24: Which two temperature conversions are incorrect? 1. 15°C = 288°K 2. 98.6°C = 32°F 3. 20°F = –6.7°C 4. 100°C = 273°K

A. 2 and 4 (Correct)
B. 1 and 3
C. 3 and 4
D. 1 and 2

Rationale: °K = °C + 273 288°K = 15°C + 273 288 = 288

Q25: What is 101°F in Celsius?

A. 24°C
B. 145°C
C. 38.3°C (Correct)
D. 56.1°C

Rationale: °C = 5/9(°F – 32) °C = 5/9(°101 – 32) °C = 5/9(69) °C = 38.3

Q26: A reduction in the force of gravity will cause the atmospheric pressure to

A. shift.
B. increase.
C. decrease. (Correct)
D. remain constant.

Rationale: Atmospheric pressure is highest at sea level. An increase in altitude will cause atmospheric pressure to decrease, which leads to a decrease in the force of gravity.

Q27: The effects of buoyancy are best explained by

A. Archimedes principle. (Correct)
B. Bernoulli principle.
C. Dalton’s law.
D. Boyle’s law.

Rationale: Buoyancy occurs when an object is submerged in water. The object feels lighter than it is above water. The Bernoulli principle, Dalton’s law, and Boyle’s law relate to how gases or fluids vary with changes in pressure, volume, or temperature.

Q28: Specific gravity is defined as 1. A measure of density 2. An application of Archimedes principle 3. A measurement that can be performed on liquids only 4. An application of Boyle's law

A. 1 and 4
B. 1 and 2 (Correct)
C. 2 and 3
D. 2, 3, and 4

Rationale: Specific gravity calculations use Archimedes principle in comparing a substance's weight and density relative to a standard. The measurement of specific gravity can also be applied to gases.

Q29: Sublimation can occur in which substance?

A. Dry ice (Correct)
B. Gelatin (e.g., Jell-O)
C. Water
D. Glass

Rationale: This process, called sublimation, occurs when the heat content of a substance increases to a point at which the molecules in the solid state gain enough energy to break loose and enter the gaseous state while remaining below its melting point. The conversion of solid carbon dioxide (i.e., dry ice) to gaseous carbon dioxide is the most common example of this process.

Q30: A hydrometer is used to measure 1. Hydrogen content. 2. Specific gravity. 3. Weight density. 4. Water vapor.

A. 1 and 3
B. 2 and 4
C. 2 and 3 (Correct)
D. 1, 2, and 3

Rationale: Hydrometers are used to measure the weight density or specific gravity of liquids.

Q31: Which of the following processes are part of respiration? 1. Sublimation 2. Condensation 3. Evaporation 4. Vaporization

A. 1 and 3
B. 2 and 3 (Correct)
C. 2 and 4
D. 1, 2, and 4

Rationale: Evaporation and condensation are essential components of respiration. Specifically, effective ventilation requires a balance between the evaporation and condensation of the moisture of respired gases so that the airway mucosa are not dried and irritated.

Q32: A convex meniscus in a glass tube of mercury indicates

A. cohesive forces of mercury are weak.

B. cohesive forces of mercury are strong. (Correct)

C. adhesive forces within the mercury are strong.

D. adhesive forces between the mercury and the glass are strong.

Rationale: The cohesive forces within the mercury are stronger than the adhesive forces between the mercury and the glass. If the cohesive forces within the mercury were weaker than the adhesive forces, the meniscus would be concave. Box 1.5 in the text presents another application involving adhesive and cohesive forces.

Q33: Which substance has the lowest surface tension?

A. Water at 20°C

B. Water at 37°C

C. Blood at 37°C

D. Ethyl alcohol at 20°C (Correct)

Rationale: Examples of Surface Tension Substance°CSurface tension (dyn/cm)Water2073Water3770Tissue fluid3750Whole blood3758Plasma3773

Q34: The surface tension of a liquid

A. does not vary with temperature.

B. increases as temperature increases.

C. increases as temperature decreases.

D. decreases as temperature increases. (Correct)

Rationale: The surface tension of any given liquid varies inversely with its temperature. Adding heat to a liquid causes the molecules to move more vigorously and break the bonds that are holding them in liquid form.

Q35: According to Laplace's law, if the surface tension of a sphere is doubled, pressure will

A. decrease by one half.

B. increase by one half.

C. quadruple.

D. double. (Correct)

Rationale: Laplace's law, P = 2(ST/r), states that the pressure within a sphere is directly related to the surface tension of the liquid and inversely related to the radius of the sphere; that is, both surface tension and pressure within a sphere will change equally in the same proportion.

Q36: Which equations correctly relate density, volume, and mass? 1. Density = volume/mass 2. Volume = density/mass 3. Mass = (density)/(volume) 4. Weight density = weight/volume

A. 1 and 3

B. 1 and 4

C. 2 and 3

D. 3 and 4 (Correct)

Rationale: Given density, d = mass (m)/volume (v), the equation can be solved for each variable: m = dv, v = m/d. When mass is substituted by weight, dw = w/v.

Q37: Boyle's law describes the relationship between which of the following?

A. Pressure and temperature

B. Volume and temperature

C. Volume and pressure (Correct)

D. Pressure and density

Rationale: Boyle's law states that at a constant temperature, the volume of a gas varies inversely proportional to pressure [V = 1/P]. The relationship between volume and temperature is expressed in Charles' law. The relationship between pressure and temperature is described by Gay-Lussac's law.

Q38: If temperature is constant, which pressure results in the largest volume?

A. 15 mm Hg (Correct)

B. 760 mm Hg

C. 1520 mm Hg

D. 2000 mm Hg

Rationale: Using Boyle's Law P1V1 = P2V2 Or V = 1/P

Q39: Which equation represents Boyle's law?

A. V = 2P

B. V = 1/2P

C. P1V1 = P2V2 (Correct)

D. P1/P2 = V1/V2

Rationale: Boyle's law can be expressed as a ratio: P1V1 = P2V2.

Q40: Which gas law describes the pressure-temperature relationship at constant volume?

A. Gay-Lussac's

B. Newton's

C. Charles' (Correct)

D. Boyle's

Rationale: The relationship between pressure and volume is described by Boyle's law; between volume and temperature, by Charles' law; between pressure and temperature, by Gay-Lussac's law. Newton detailed the many relationships of gravitational force and motion.

Q41: Which gas law describes the relationship between the temperature and pressure of a gas when volume is constant?

A. Gay-Lussac's law (Correct)
B. Charles' law
C. Dalton's law
D. Boyle's law

Rationale: Gay-Lussac expressed the relationship between pressure and temperature.

Q42: A direct relationship between volume and temperature is explained by

A. Gay-Lussac's.
B. Charles'. (Correct)
C. Dalton's.
D. Boyle's.

Rationale: Charles' law is stated as follows: that the volume of a given amount of gas held at a constant pressure increases proportionately with increases in the temperature of the gas. The relationship between volume and temperature can be explained by the fact that as the temperature of the gas increases, the KE of the gas molecules increases.

Q43: The temperature of a gas rises with pressure when

A. the gas reaches absolute zero.
B. container remains constant.
C. Volume is held constant. (Correct)
D. Volume is increased.

Rationale: When the volume of a gas is constant, the temperature of the gas will rise as the pressure is increased (Gay-Lussac's law). Absolute zero is a theoretical temperature that has never been reached. The size of the container does not vary directly with volume.

Q44: The combined-gas law best describes

A. gas behavior at constant volume.
B. The joint behavior of pressure, volume, and temperature.
C. The additive pressures of gas mixtures.
D. The macroscopic behavior of gases when any or all variables change simultaneously. (Correct)

Rationale: The combined-gas law describes the macroscopic behavior of gases when any or all of the variables change simultaneously. As such, the combined-gas law states that the absolute pressure of a gas is inversely related to the volume it occupies and directly related to its absolute temperature, or PV/T = nR.

Q45: The sum of the partial pressures of a gas mixture equals the total gas pressure of the system. This statement represents which of the following laws?

A. Dalton's law (Correct)

B. Avogadro's law

C. The combined-gas law

D. Boltzmann's Universal Gas Constant

Rationale: The correct answer is Dalton's law. This law states that the total pressure of a gas is equal to the sum of the partial pressure of the gases that make up the mixture. The partial pressure of a gas within a gas mixture can be calculated by multiplying the total pressure of the mixture by the percentage of the mixture it occupies.

Q46: The partial pressure of a gas can be obtained by doing which of the following?

A. Multiplying the total mixture pressure by the percentage area a particular gas occupies (Correct)

B. Multiplying the atmospheric pressure by the percentage of water vapor present

C. Subtracting the partial pressure of water vapor from the atmospheric pressure

D. Dividing the total pressure of a gas mixture by the atmospheric pressure

Rationale: Dalton's law states that the sum of the partial pressures of a gas mixture equals the total pressure of the system. Therefore, the partial pressure of a single gas may be calculated by multiplying the percentage of the gas in the gas mixture by the total pressure.

Q47: The partial pressure of 25% oxygen in a gas mixture at an atmospheric pressure of 760 mm Hg is

A. 190 mm Hg. (Correct)

B. 30.4 mm Hg.

C. 1900 mm Hg.

D. 159.6 mm Hg.

Rationale: Partial pressure of oxygen = % oxygen x barometric pressure, or 0.25 x 760 mm Hg = 190 mm Hg.

Q48: Avogadro's law is used in calculating 1. Specific gravity. 2. Diffusion rate. 3. Gas density. 4. Osmosis.

A. 1 and 2

B. 1 and 3 (Correct)

C. 2 and 4

D. 3 and 4

Rationale: A practical application of Avogadro's law is seen in the calculation of gas densities and specific gravity.

Q49: At what temperature would you expect to see the highest water–vapor pressure?

A. 0°C

B. 40°C

C. 100°C (Correct)

D. Absolute zero

Rationale: The higher the temperature, the more water vapor a gas can hold.

Q50: The movement of gas molecules from an area of high concentration to one of lower concentration describes the property of which of the following?

A. Osmosis

B. Effusion

C. Diffusion (Correct)

D. Suspension

Rationale: Diffusion is movement of molecules from areas of high concentrations to low concentrations. Effusion refers to the seepage or loss of blood through torn blood vessels. Osmosis describes the movement of water across a semipermeable membrane from a less-concentrated to a more-concentrated area. Suspensions are mixtures of solutions with undissolved particles or molecules.

Q51: Which law states that when two gases are placed under the same temperature and pressure, the rates of diffusion of both gases are inversely proportional to the square root of their densities?

A. Graham's law (Correct)

B. Henry's law

C. Mole's law (also known as the ideal gas law)

D. Fick's law

Rationale: Graham's law states that when two gases are placed under the same temperature and pressure conditions, the rates of diffusion of the two gases are inversely proportional to the square root of their masses, or r1/r2 = O■M2/M1, where r1 and r2 represent the diffusion rates of the respective gases and M1 and M2 are the molar masses.

Q52: The law that describes the diffusion of a gas across a semipermeable membrane is

A. Fick's law. (Correct)

B. Henry's law.

C. Graham's law.

D. Charles' law.

Rationale: Fick's law represents the flow of gases across semipermeable membranes. Henry's law explains the relationship of a gas and a liquid in a combined space. Graham's law involves the relationship of multiple gases placed under the same temperature and pressure, and Charles' law states that the volume of gas varies directly with changes in temperature.

Q53: Fluid mechanics is a branch of physics that involves which of the following? 1. Hydrodynamics 2. Fluids in motion 3. Thermodynamics 4. Electrical properties of gases

A. 2 and 3

B. 1 and 2 (Correct)

C. 1 and 4

D. 3 and 4

Rationale: Fluid mechanics deals with the behavior of fluids in motion and involves fluid dynamics. Hydrodynamics is the study of fluids in motion.

Q54: Which of the following devices are used to measure atmospheric pressure? 1. Aneroid barometer 2. Wheatstone Bridge 3. Mercury barometer 4. Hygrometer

A. 1 and 2

B. 1 and 3 (Correct)

C. 2 and 3

D. 3 and 4

Rationale: Atmospheric pressure can be measured with a barometer. The aneroid barometer measures atmospheric pressure by equilibrating the atmospheric gas pressure with a mechanical force, or the expansion force of an evacuated metal container. Atmospheric pressure can be measured with a barometer similar to the one shown in Fig. 1.4. The mercury barometer, which was invented by Evangelista Torricelli (c. 1608 to 1647), is the most commonly used device for measuring atmospheric pressure. (Torricelli was the first person to recognize the existence of atmospheric pressure; the pressure measurement torr is named in his honor.)

Q55: When the movement of fluid molecules is streamlined, this flow is normally described as

A. straight.

B. laminar. (Correct)

C. turbulent.

D. aerodynamic.

Rationale: In laminar flow, the fluid flows in discrete cylindrical layers or streamlines. With turbulent flow, the movement of fluid becomes chaotic. Straight and aerodynamic are not terms that are used to describe the way fluid moves.

Q56: When tubes have one or more branches, the flow becomes

A. transitional. (Correct)

B. restricted.

C. turbulent.

D. laminar.

Rationale: Transitional flow is a mixture of laminar and turbulent flows that typically occur where tubes divide. See Fig. 1.15. Restricted flow occurs when narrowing or constrictions occur along the length of a tube. Laminar and turbulent flows can become restricted if an obstruction is encountered along the length of a tube.

Q57: The relationship between pressure, flow, and resistance for a liquid flowing through a tube represents

A. Reynolds' number.
B. Poiseuille's law. (Correct)
C. Venturi principle.
D. Bernoulli principle.

Rationale: When considering the flow of a liquid through a tube, you should take two factors into consideration: the driving pressure forcing the fluid and the resistance the liquid must overcome as it flows. Reynolds suggested that fluid flow becomes turbulent when velocity is increased or when there are changes in fluid density or viscosity and the radius of the tube. The Venturi and Bernoulli principles deal with the relationship between a liquid's forward velocity and tubular lateral-wall pressure.

Q58: Applying the principles of Poiseuille's law, which statement is true?

A. The resistance offered by a tube is inversely proportional to its length.
B. As the radius of a tube decreases, the pressure gradient increases. (Correct)
C. The more viscous the fluid, the easier it is to move the fluid through a tube.
D. The driving pressure of a gas is indirectly proportional with the length of the tube.

Rationale: Poiseuille's law can be rewritten as: DP = Q x [(8nl)/(pr4)]. According to this equation, the following statements can be made. The more viscous a fluid, the greater the pressure gradient required to cause it to move through a given tube. The resistance offered by a tube is directly proportional to its length. The pressure required to achieve a given flow through a tube must increase in direct proportion to the length of the tube. The resistance to flow is inversely proportional to the fourth power of the radius. Small changes in the radius of a tube will cause profound increases in the resistance to flow through that tube.

Q59: Which form of Poiseuille's law applies to breathing mechanics?

A. [Image omitted]
B. [Image omitted]
C. [Image omitted] (Correct)
D. [Image omitted]

Rationale: Poiseuille's law states that the pressure gradient required to cause a liquid to move through a tube is equal to the flow of the liquid through the tube multiplied by the resistance to flow. In a discussion of gases, the term flow of the liquid is replaced with flow of the gas. Therefore, the flow of the gas is equal to the pressure gradient divided by the resistance to flow.

Q60: As a fluid flows through a tube of uniform diameter, pressure drops progressively over the length of the tube. This illustrates an application of which of the following?

A. Coanda effect
B. Venturi principle
C. Bernoulli principle (Correct)

D. Reynolds' number

Rationale: Bernoulli stated that "As the forward velocity of a gas, or liquid, moving through a tube increases, the lateral wall pressure of the tube will decrease." Venturi postulated that pressure drops of fluids moving through constriction along a tube can be reversed if there is gradual dilation in the tube distal to the constriction. The Coanda effect is also based on the Bernoulli principle and demonstrates that water or gas flow can be deflected through a full 180 degrees by careful placement of postconstriction extensions. Reynolds' number is the result of this mathematical equation: NR = v x d x (2r/h). The turbulent flow is greater when the Reynolds' number exceeds 2000.

Q61: Placement of post constriction extensions in a tube can deflect a flow 180 degrees along a new wall contour. This phenomenon illustrates the

A. Coanda effect. (Correct)
B. Venturi principle.
C. Bernoulli principle.
D. Bernoulli–Coanda inversion.

Rationale: Coanda was able to demonstrate that, with careful placement of the post constriction extensions, he could deflect a stream of air through a full 180-degree turn by extending the wall contour.

Q62: Electricity is the flow of

A. negative ions through a nonconductive path.
B. negative ions over a nonconductive circuit.
C. electrons through a piece of copper wire. (Correct)
D. electrons in a bidirectional path.

Rationale: Electricity is produced by the flow of electrons through a conductive material such as copper. Electricity cannot flow through nonconductive material or simultaneously run bidirectionally along the same path.

Q63: Which of the following correctly expresses Ohm's law?

A. R = I x V
B. V = I x R (Correct)
C. I = V x R
D. V = I/R

Rationale: The relationships among current, voltage, and resistance can be explained with Ohm's law: V = I x R.

Q64: According to Ohm's law, assuming that the voltage is held constant, what will happen to the resistance if the current is doubled?

A. It will remain the same.

B. It will be doubled.

C. It will quadruple.

D. It will be halved. (Correct)

Rationale: Given the fact that when resistance is constant, there is a direct relationship between voltage and current; when voltage is constant, there is an indirect or inverse relationship between current and resistance. Therefore, if current is increased, resistance would have to decrease proportionately.

Q65: A major disadvantage of a series circuit is which of the following?

A. It is limited to one load.

B. It can contain unlimited resistance.

C. Electrical current will stop if a break occurs anywhere along the path. (Correct)

D. The circuit will remain up if a break occurs in one of the branches.

Rationale: In a series circuit, there is only one path. If a break occurs anywhere in the path, the entire circuit will fail.

Q66: Which organ in the human body is most susceptible to electrical shock?

A. Skin

B. Heart (Correct)

C. Brain

D. Lungs

Rationale: Although all body tissues and organs are susceptible to electrical shock, the heart is the most vulnerable because it is governed by electricity.

Q67: Which of the following is a series-parallel circuit that consists of a direct current (DC) voltage source and a galvanometer that connects two parallel branches containing four resistors?

A. Hunter Christie bridge

B. Wheatstone bridge (Correct)

C. Transducer

D. Circuit analysis

Rationale: The Wheatstone bridge is a series-parallel circuit that consists of a DC voltage source (e.g., a battery) and a galvanometer that connects two parallel branches containing four resistors (R1, R2, R3, and RX).