APPLIED SCIENCE 1ST YEAR

PHYSICS CHEMISTRY COMPLETE MCQ BOOK FOR ALL DISCIPLINE

Physics Chapter 1: The Nature of Science

1. **Physics is a branch of science that deals with the study of:**
    - A) Living organisms
    - B) Matter, energy, and their relationship
    - C) Chemical reactions
    - D) Social behaviors
2. **Which of the following is considered the first step of the scientific method?**
    - A) Testing the hypothesis
    - B) Data collection
    - C) Observation and formulation of a question
    - D) Analysis and conclusion
3. **The process of objectively establishing facts through testing and experimentation is known as:**
    - A) Philosophical inquiry
    - B) The scientific method
    - C) Speculation
    - D) Subjective reasoning
4. **A tentative explanation for an observation that can be tested is called a:**
    - A) Law
    - B) Theory
    - C) Hypothesis
    - D) Conclusion
5. **Scientists use experiments to determine if a hypothesis is:**
    - A) Popular or unpopular
    - B) Supported or contradicted
    - C) Expensive or cheap
    - D) Complex or simple
6. **Which branch of physics deals with the study of motion and its causes?**
    - A) Thermodynamics
    - B) Mechanics
    - C) Optics
    - D) Nuclear physics
7. **The final step in the scientific method usually involves:**
    - A) Making a new observation
    - B) Data collection
    - C) Analysis and Conclusion
    - D) Ignoring the results
8. **In the scientific method, what follows the formulation of a hypothesis?**
    - A) Final report
    - B) Testing the hypothesis (Experimentation)
    - C) Asking a question

- D) Observation

9. **The study of the nature of science helps in building a(n):**
   - A) Objective framework for inquiry
   - B) Subjective opinion
   - C) Random guess
   - D) Cultural myth
10. **Frontiers of fundamental science include the study of:**
   - A) Only large objects
   - B) Only small objects
   - C) The very large, the very small, and complex matter
   - D) Only biological systems

(Note: Continuing with 20 more questions based on Physics Chapter 1 content)

11. **Which step involves the use of mathematics to interpret results?** (Analysis)
12. **What increases or decreases based on experimental results?** (Confidence in the hypothesis)
13. **Why do we ask "Why is the sky black at night?" in science?** (To start a scientific inquiry)
14. **Is a hypothesis always correct?** (No, it can be contradicted)
15. **Physics is a _____ science.** (Fundamental)
16. **What defines the "Nature of Science"?** (Systematic study)
17. **Objectivity in science means:** (Removing personal bias)
18. **The scientific method aims to construct a(n):** (Accurate version of natural phenomena)
19. **If an experiment contradicts a hypothesis, the scientist should:** (Revise the hypothesis)
20. **Science is based on:** (Evidence and testing)
21. **The word "Physics" comes from the Greek word for:** (Nature)
22. **Experimental data is used to:** (Verify the hypothesis)
23. **Which branch of science studies sub-atomic particles?** (Physics)
24. **Scientific inquiry begins with:** (Curiosity/Observation)
25. **The "Frontiers of Science" include the "Universe" as a whole.** (True)
26. **What is a "Fact" in science?** (A verified observation)
27. **Can a scientific theory change?** (Yes, with new evidence)
28. **Which of these is NOT a step in the scientific method?** (Guessing without observing)
29. **What is the goal of scientific investigation?** (Reliable knowledge)
30. **Physics provides the basis for:** (Engineering and Technology)

Chemistry Chapter 1: Composition of Substance

1. **The modern definition of an element is a substance made of:**
   - A) Different types of atoms
   - B) The same type of atoms
   - C) Only molecules

- D) Mixtures of gases

2. **How many naturally occurring elements have been discovered?**
   - A) 118
   - B) 92
   - C) 63
   - D) 10
3. **Which of the following is an example of a macromolecule?**
   - A) Oxygen (O2)
   - B) Hydrogen (H2)
   - C) Hemoglobin
   - D) Water (H2O)
4. **The most abundant element in the Earth's crust (47% by weight) is:**
   - A) Silicon
   - B) Aluminum
   - C) Oxygen
   - D) Iron
5. **A molecule that consists of a large number of atoms and has a high molecular weight is a:**
   - A) Micromolecule
   - B) Macro-molecule
   - C) Sub-atomic particle
   - D) Valency
6. **Which element makes up 78% of the Earth's atmosphere?**
   - A) Oxygen
   - B) Nitrogen
   - C) Argon
   - D) Carbon dioxide
7. **Substances that cannot be broken down into simpler units by ordinary chemical processes are:**
   - A) Compounds
   - B) Mixtures
   - C) Elements
   - D) Solutions
8. **Hemoglobin is approximately how many times heavier than a hydrogen atom?**
   - A) 10,000
   - B) 68,000
   - C) 118
   - D) 92
9. **Which state do most elements exist in at room temperature?**
   - A) Liquid
   - B) Gas
   - C) Solid
   - D) Plasma
10. **The number of atoms in a single molecule of hemoglobin is approximately:**
    - A) 100
    - B) 1,000

- C) 10,000
- D) 68,000

(Note: Continuing with 20 more questions based on Chemistry Chapter 1 content)

11. **What is the percentage of Oxygen in the Oceans by weight?** (86%)
12. **Silicon makes up what percentage of the Earth's crust?** (28%)
13. **Which of these was NOT one of the 9 elements known in early ages?** (Oxygen)
14. **Small sized molecules like O2 are called:** (Micromolecules)
15. **What is the symbol for Gold?** (Au - though early elements included carbon, gold, etc.)
16. **Elements in a compound are combined:** (Chemically)
17. **The smallest particle of an element that retains its properties is:** (Atom)
18. **Valency is the _____ of an element.** (Combining capacity)
19. **An empirical formula represents:** (The simplest ratio of atoms)
20. **Is water an element or a compound?** (Compound)
21. **Sub-atomic particles include:** (Protons, Neutrons, Electrons)
22. **What is the percentage of Nitrogen in the atmosphere?** (78%)
23. **Which element is a liquid at room temperature?** (Mercury/Bromine)
24. **A chemical formula shows:** (Types and number of atoms)
25. **Matter is defined as anything that has:** (Mass and occupies space)
26. **The mass of an atom is mostly in its:** (Nucleus)
27. **Macro-molecules are found in:** (Living organisms, e.g., Hemoglobin)
28. **Argon makes up what percentage of the atmosphere?** (0.9%)
29. **How many elements were known by the end of the 19th century?** (63)
30. **Elements can be classified into:** (Metals, Non-metals, Metalloids)

Physics Chapter 2: Measurement

1. **Which of the following is a base quantity in the SI system?**
   - A) Velocity
   - B) Length
   - C) Force
   - D) Pressure
2. **The SI unit of thermodynamic temperature is:**
   - A) Celsius
   - B) Fahrenheit
   - C) Kelvin
   - D) Candela
3. **How many base units are there in the International System of Units (SI)?**
   - A) 3
   - B) 5
   - C) 7
   - D) 9
4. **The prefix "milli" represents which factor?**
   - A) 10^{-2}
   - B) 10^{-3}

- C) 10^{-6}
- D) 10^{3}

5. **Which of these is a derived unit?**
   - A) Meter
   - B) Kilogram
   - C) Newton
   - D) Second
6. **The unit of luminous intensity is:**
   - A) Mole
   - B) Ampere
   - C) Candela
   - D) Radian
7. **1 micrometer (μm) is equal to:**
   - A) 10^{-6} m
   - B) 10^{-9} m
   - C) 10^{-3} m
   - D) 10^{6} m
8. **The standard unit of mass in the SI system is the:**
   - A) Gram
   - B) Pound
   - C) Kilogram
   - D) Tonne
9. **Which unit is used to measure the amount of a substance?**
   - A) Kilogram
   - B) Mole
   - C) Ampere
   - D) Liter
10. **The prefix "kilo" represents:**
    - A) 100
    - B) 1000
    - C) 10,000
    - D) 1,000,000
11. **Significant figures in a measurement include:**
    - A) Only the first digit
    - B) Only estimated digits
    - C) All accurately known digits and the first doubtful digit
    - D) All digits shown on a calculator
12. **The error caused by the incorrect position of the eye while taking a reading is:**
    - A) Random error
    - B) Systematic error
    - C) Parallax error
    - D) Zero error
13. **Which instrument is used to measure internal and external diameters of a tube?**
    - A) Meter rule
    - B) Vernier Callipers
    - C) Screw Gauge

- D) Spherometer

14. **The least count of a standard Vernier Callipers is:**
    - A) 0.1 cm
    - B) 0.01 cm
    - C) 1 mm
    - D) 0.001 cm
15. **A Screw Gauge is also known as a:**
    - A) Micrometer
    - B) Caliper
    - C) Ruler
    - D) Protractor
16. **The zero error is positive if the zero mark of the circular scale is:**
    - A) Above the index line
    - B) Below the index line
    - C) On the index line
    - D) Not visible
17. **Which error occurs due to the faulty construction of a measuring instrument?**
    - A) Random error
    - B) Systematic error
    - C) Human error
    - D) Environmental error
18. **The pitch of a screw gauge is the distance moved by the spindle in:**
    - A) Two rotations
    - B) One rotation
    - C) Half rotation
    - D) Ten rotations
19. **If the zero of the vernier scale is to the right of the zero of the main scale, the error is:**
    - A) Negative
    - B) Positive
    - C) Zero
    - D) Neutral
20. **Scientific notation is a way of expressing numbers as a product of a power of:**
    - A) 2
    - B) 5
    - C) 10
    - D) 100
21. **The SI unit of electric current is:** (Ampere)
22. **The total number of digits in 0.00508 is:** (3)
23. **What is the multiplier for "Nano"?** (10^{-9})
24. **Measurement of time is based on the vibrations of which atom?** (Cesium-133)
25. **One liter is equal to how many dm^3?** (1)
26. **What is the least count of a meter rod?** (1 mm)
27. **Physical quantities are divided into base and _____ quantities.** (Derived)
28. **"Mega" prefix stands for:** (10^6)
29. **Which scale is used for very small thickness measurements?** (Screw Gauge)

30. **Rounding off 3.745 to two decimal places gives:** (3.74 or 3.75 depending on rules used)

Chemistry Chapter 2: Chemical Formulas and Equations

1. **A group of symbols representing a compound is called a:**
    - A) Chemical symbol
    - B) Chemical formula
    - C) Chemical reaction
    - D) Valency
2. **The valency of Oxygen is usually:**
    - A) +1
    - B) -1
    - C) -2
    - D) +2
3. **A formula that shows the actual number of atoms of each element in a molecule is the:**
    - A) Empirical formula
    - B) Molecular formula
    - C) Structural formula
    - D) Simplest formula
4. **The empirical formula of Benzene (C_6H_6) is:**
    - A) C_2H_2
    - B) CH
    - C) C_3H_3
    - D) C_6H_6
5. **What is the chemical formula for Glucose?**
    - A) CH_4
    - B) $C_{12}H_{22}O_{11}$
    - C) $C_6H_{12}O_6$
    - D) CO_2
6. **The sum of atomic masses of all atoms in a molecule is the:**
    - A) Atomic mass
    - B) Formula mass
    - C) Molecular mass
    - D) Molar volume
7. **An atom or group of atoms having a net charge is called an:**
    - A) Element
    - B) Ion
    - C) Molecule
    - D) Isotope
8. **Positive ions are called:**
    - A) Anions
    - B) Cations
    - C) Neutrons

- D) Electrons

9. **The molecular mass of Water (H_2O) is:**
   - A) 16 amu
   - B) 18 amu
   - C) 2 amu
   - D) 20 amu
10. **A chemical equation represents:**
   - A) A physical change only
   - B) A chemical reaction using symbols and formulas
   - C) The cost of chemicals
   - D) The speed of a reaction
11. **In a chemical equation, the substances on the left side are called:**
   - A) Products
   - B) Reactants
   - C) Catalysts
   - D) Precipitates
12. **The process of equalizing the number of atoms on both sides of an equation is:**
   - A) Balancing
   - B) Evaporation
   - C) Sublimation
   - D) Titration
13. **Which law states that mass is neither created nor destroyed in a chemical reaction?**
   - A) Law of Definite Proportions
   - B) Law of Conservation of Mass
   - C) Boyle's Law
   - D) Avogadro's Law
14. **The formula $NaCl$ represents:**
   - A) Sodium Chloride
   - B) Sodium Carbonate
   - C) Sodium Chlorate
   - D) Sodium Hydroxide
15. **A polyatomic ion with a negative charge is generally called an:**
   - A) Ionic compound
   - B) Acid radical
   - C) Basic radical
   - D) Atom
16. **What is the valency of Sodium (Na)?**
   - A) +1
   - B) -1
   - C) +2
   - D) 0
17. **Which of the following is a diatomic molecule?**
   - A) He
   - B) H_2
   - C) P_4
   - D) S_8

18. **The chemical formula for Sulfuric Acid is:**
    - A) HCl
    - B) HNO_3
    - C) H_2SO_4
    - D) H_3PO_4
19. **Formula mass is used specifically for:**
    - A) Molecular compounds
    - B) Ionic compounds
    - C) Gases only
    - D) Liquid elements
20. **If an atom loses an electron, it becomes a:**
    - A) Negative ion
    - B) Positive ion
    - C) Neutral atom
    - D) Molecule
21. **What is the molecular mass of CO_2?** (44 amu)
22. **The symbol 'aq' in an equation stands for:** (Aqueous/Water solution)
23. **What is the empirical formula of H_2O_2?** (HO)
24. **Cations are formed by _____ of electrons.** (Loss)
25. **The formula for Aluminum Oxide is:** (Al_2O_3)
26. **Which part of the atom is involved in chemical bonding?** (Valence electrons)
27. **Balance this: $H_2 + O_2 \rightarrow \text{?}$** ($2H_2 + O_2 \rightarrow 2H_2O$)
28. **A radical like SO_4^{2-} is called:** (Sulfate)
29. **The molecular mass of NH_3 is:** (17 amu)
30. **Compounds consisting of two elements are called:** (Binary compounds)

Physics Chapter 3: Force and Motion

1. **The change in position of a body with respect to its surroundings is called:**
    - A) Rest
    - B) Motion
    - C) Velocity
    - D) Acceleration
2. **Distance is a _____ quantity, while displacement is a _____ quantity.**
    - A) Vector, Scalar
    - B) Scalar, Vector
    - C) Large, Small
    - D) Constant, Variable
3. **The rate of change of displacement is known as:**
    - A) Speed
    - B) Acceleration
    - C) Velocity
    - D) Momentum
4. **If a body covers equal distances in equal intervals of time, its speed is:**
    - A) Variable
    - B) Uniform

- C) Instantaneous
- D) Average

5. **The SI unit of acceleration is:**
   - A) m/s
   - B) km/h
   - C) m/s^2
   - D) kg·m/s
6. **A negative acceleration is also known as:**
   - A) Velocity
   - B) Retardation or Deceleration
   - C) Inertia
   - D) Force
7. **Newton's First Law of Motion is also called the Law of:**
   - A) Gravity
   - B) Conservation
   - C) Inertia
   - D) Momentum
8. **The mathematical form of Newton's Second Law is:**
   - A) F = ma
   - B) w = mg
   - C) P = mv
   - D) v = s/t
9. **The force with which Earth attracts a body toward its center is called:**
   - A) Mass
   - B) Friction
   - C) Weight
   - D) Tension
10. **The SI unit of Force is:**
    - A) Joule
    - B) Watt
    - C) Newton
    - D) Pascal
11. **Momentum is the product of mass and:**
    - A) Time
    - B) Acceleration
    - C) Velocity
    - D) Distance
12. **The action and reaction mentioned in Newton's Third Law:**
    - A) Act on the same body
    - B) Act on different bodies
    - C) Are never equal
    - D) Act in the same direction
13. **Which of the following reduces friction?**
    - A) Making surfaces rough
    - B) Using lubricants (oil/grease)
    - C) Increasing weight

- D) Increasing surface area

14. **Centripetal force always acts:**
    - A) Away from the center
    - B) Toward the center
    - C) Tangential to the path
    - D) Downward
15. **The quantity of matter in a body is its:**
    - A) Weight
    - B) Volume
    - C) Mass
    - D) Density
16. **When a bus stops suddenly, passengers lean forward due to:** (Inertia)
17. **Weight is measured using a:** (Spring balance)
18. **The value of 'g' on Earth's surface is approximately:** (9.8 m/s^2)
19. **Friction is a force that _____ motion.** (Opposes)
20. **A body is in equilibrium if the net force acting on it is:** (Zero)
21. **The unit of momentum is:** ($kg \cdot m/s$ or $N \cdot s$)
22. **Mass is a _____ quantity.** (Scalar)
23. **The slope of a distance-time graph represents:** (Speed)
24. **Sliding friction is always _____ than rolling friction.** (Greater)
25. **Is mass constant everywhere in the universe?** (Yes)
26. **What is the formula for Weight?** ($W = mg$)
27. **A ball thrown upward has an acceleration of _____ at its peak.** (9.8 m/s^2 downward)
28. **Banking of roads is done to provide necessary _____ force.** (Centripetal)
29. **The force that keeps a body moving in a circle is:** (Centripetal force)
30. **One Newton is equal to:** ($1\ kg \cdot m/s^2$)

Chemistry Chapter 3: Atomic Structure

1. **The word "Atom" is derived from the Greek word "Atomas," meaning:**
    - A) Small
    - B) Invisible
    - C) Indivisible
    - D) Hard
2. **Who proposed the first atomic theory based on scientific evidence?**
    - A) Dalton
    - B) Rutherford
    - C) Bohr
    - D) Thomson
3. **The subatomic particle with a negative charge is the:**
    - A) Proton
    - B) Neutron
    - C) Electron
    - D) Nucleus

4. **Cathode rays are actually a stream of:**
    - A) Protons
    - B) Neutrons
    - C) Electrons
    - D) Positrons
5. **The nucleus of an atom was discovered by:**
    - A) J.J. Thomson
    - B) Lord Rutherford
    - C) Neil Bohr
    - D) James Chadwick
6. **The number of protons in the nucleus of an atom is called its:**
    - A) Mass number
    - B) Atomic number
    - C) Valency
    - D) Isotope number
7. **Neutrons were discovered by:**
    - A) Goldstein
    - B) Bohr
    - C) James Chadwick
    - D) Dalton
8. **According to Bohr's theory, electrons revolve in fixed:**
    - A) Paths
    - B) Orbits/Shells
    - C) Clouds
    - D) Nuclei
9. **Atoms of the same element with the same atomic number but different mass numbers are:**
    - A) Isomers
    - B) Isotopes
    - C) Isobars
    - D) Allotropes
10. **The maximum number of electrons in the 'K' shell is:**
    - A) 2
    - B) 8
    - C) 18
    - D) 32
11. **The 'L' shell can accommodate a maximum of _____ electrons.**
    - A) 2
    - B) 8
    - C) 18
    - D) 32
12. **Which subatomic particle has no charge?**
    - A) Proton
    - B) Electron
    - C) Neutron
    - D) Ion

13. **The mass of a proton is approximately how many times that of an electron?**
    - A) 100 times
    - B) 1840 times
    - C) 10,000 times
    - D) Equal
14. **The sum of protons and neutrons in an atom is the:**
    - A) Atomic number
    - B) Mass number
    - C) Relative mass
    - D) Valency
15. **Which isotope of Hydrogen contains no neutron?**
    - A) Protium
    - B) Deuterium
    - C) Tritium
    - D) Helium
16. **Electronic configuration of Carbon (Atomic No. 6) is:** (2, 4)
17. **Canal rays (Positive rays) were discovered by:** (Goldstein)
18. **The center of the atom is called the:** (Nucleus)
19. **Plum pudding model was proposed by:** (J.J. Thomson)
20. **Isotopes differ in their number of:** (Neutrons)
21. **How many isotopes does Carbon have?** (Three: C-12, C-13, C-14)
22. **The formula to find the max electrons in a shell is:** ($2n^2$)
23. **Which isotope is used in the treatment of cancer?** (Cobalt-60)
24. **Rutherford used _____ particles in his scattering experiment.** (Alpha)
25. **The charge on an alpha particle is:** (+2)
26. **Most of the volume of an atom is:** (Empty space)
27. **Valence electrons are located in the _____ shell.** (Outermost)
28. **Chlorine has two isotopes with mass numbers:** (35 and 37)
29. **Which isotope is used to diagnose goiter?** (Iodine-131)
30. **The subatomic particles that reside in the nucleus are called:** (Nucleons)

Physics Chapter 4: Work and Energy

1. **Work is defined as the product of force and:**
    - A) Time
    - B) Velocity
    - C) Displacement in the direction of force
    - D) Acceleration
2. **The SI unit of Work and Energy is:**
    - A) Watt
    - B) Joule
    - C) Newton
    - D) Pascal
3. **If the force and displacement are in the same direction, the work done is:**
    - A) Zero
    - B) Negative

- C) Maximum
- D) Minimum

4. **The energy possessed by a body due to its motion is:**
   - A) Potential Energy
   - B) Kinetic Energy
   - C) Chemical Energy
   - D) Nuclear Energy
5. **The formula for Kinetic Energy (K.E) is:**
   - A) mgh
   - B) $1/2\ mv^2$
   - C) $F \times d$
   - D) $P \times t$
6. **Energy stored in a body due to its position or state is:**
   - A) Kinetic Energy
   - B) Potential Energy
   - C) Thermal Energy
   - D) Electrical Energy
7. **Gravitational Potential Energy (P.E) is calculated by the formula:**
   - A) $1/2\ mv^2$
   - B) mgh
   - C) F/a
   - D) W/t
8. **The rate of doing work is called:**
   - A) Energy
   - B) Torque
   - C) Power
   - D) Momentum
9. **The SI unit of Power is:**
   - A) Joule
   - B) Newton
   - C) Watt
   - D) Horsepower
10. **One Horsepower (hp) is equal to:**
    - A) 500 Watts
    - B) 746 Watts
    - C) 1000 Watts
    - D) 3600 Watts
11. **Work done is zero when the angle between force and displacement is:**
    - A) 0°
    - B) 45°
    - C) 90°
    - D) 180°
12. **Energy can neither be created nor destroyed, only transformed. This is the Law of:**
    - A) Inertia
    - B) Conservation of Energy
    - C) Thermodynamics

- D) Gravitation

13. **Which of the following is a non-renewable source of energy?**
    - A) Solar
    - B) Wind
    - C) Coal
    - D) Water (Hydro)
14. **In a battery, chemical energy is converted into:**
    - A) Sound energy
    - B) Electrical energy
    - C) Mechanical energy
    - D) Light energy
15. **The work done by a person carrying a heavy bag while standing still is:**
    - A) Maximum
    - B) Positive
    - C) Zero
    - D) Negative
16. **Energy possessed by stretched or compressed objects is:** (Elastic Potential Energy)
17. **1 Joule is equal to:** (1 Newton × 1 Meter)
18. **The main source of all energy on Earth is:** (The Sun)
19. **Efficiency of a machine is the ratio of:** (Output / Input)
20. **Power is a _____ quantity.** (Scalar)
21. **When a ball is thrown up, its K.E converts into:** (Potential Energy)
22. **Work is a _____ quantity.** (Scalar)
23. **The energy in food is measured in:** (Calories/Joules)
24. **Fossil fuels include:** (Coal, Petroleum, Natural Gas)
25. **Hydroelectric power uses _____ energy of water.** (Kinetic/Potential)
26. **What is the unit of energy used by electric companies?** (Kilowatt-hour)
27. **A moving car possesses:** (Kinetic Energy)
28. **If speed of a body is doubled, its K.E becomes:** (Four times)
29. **Potential energy depends on mass, gravity, and:** (Height)
30. **Work done against friction is converted into:** (Heat energy)

Chemistry Chapter 4: Chemical Bonding

1. **The attractive force that holds atoms together in a molecule is called:**
    - A) Physical bond
    - B) Chemical bond
    - C) Magnetic force
    - D) Gravitational force
2. **Atoms form chemical bonds to achieve:**
    - A) Instability
    - B) Higher energy
    - C) Stability (Noble gas configuration)
    - D) Radioactive decay

3. **The Rule of Eight (attaining 8 electrons in the valence shell) is called:**
    - A) Duplet rule
    - B) Octet rule
    - C) Triplet rule
    - D) Dalton's rule
4. **A bond formed by the complete transfer of electrons from one atom to another is:**
    - A) Covalent bond
    - B) Ionic bond
    - C) Metallic bond
    - D) Hydrogen bond
5. **Ionic bonds usually form between:**
    - A) Two metals
    - B) Two non-metals
    - C) A metal and a non-metal
    - D) Two noble gases
6. **A bond formed by the mutual sharing of electrons is:**
    - A) Ionic bond
    - B) Covalent bond
    - C) Coordinate covalent bond
    - D) Metallic bond
7. **In a double covalent bond, how many electrons are shared?**
    - A) 2
    - B) 4
    - C) 6
    - D) 8
8. **Sodium Chloride (NaCl) is an example of:**
    - A) Covalent compound
    - B) Ionic compound
    - C) Polar molecule
    - D) Gas
9. **A bond where the electron pair is provided by only one of the bonded atoms is:**
    - A) Single covalent bond
    - B) Coordinate covalent bond (Dative bond)
    - C) Triple bond
    - D) Non-polar bond
10. **Water (H_2O) contains which type of covalent bonds?**
    - A) Non-polar
    - B) Polar
    - C) Ionic
    - D) Coordinate
11. **The ability of an atom to attract shared electrons toward itself is:**
    - A) Ionization energy
    - B) Electron affinity
    - C) Electronegativity
    - D) Valency
12. **Which type of bond involves a "sea of mobile electrons"?**

- A) Ionic
- B) Covalent
- C) Metallic
- D) Hydrogen

13. **Ice floats on water because of:**
    - A) Ionic bonding
    - B) Covalent bonding
    - C) Hydrogen bonding
    - D) Metallic bonding
14. **Triple covalent bonds are found in which molecule?**
    - A) O_2
    - B) H_2
    - C) N_2
    - D) Cl_2
15. **Ionic compounds generally have:**
    - A) Low melting points
    - B) High melting and boiling points
    - C) No crystalline structure
    - D) Low solubility in water
16. **Covalent bonds usually form between:** (Non-metals)
17. **A molecule with a slight positive and negative end is:** (Polar)
18. **Example of a non-polar molecule is:** (H_2, O_2, CH_4)
19. **The force between molecules of a substance is called:** (Intermolecular force)
20. **Noble gases are stable because their valence shells are:** (Complete)
21. **Valency of Carbon is:** (4)
22. **The bond in HCl is:** (Polar covalent)
23. **Diamond is a giant _____ structure.** (Covalent)
24. **Metals are good conductors due to:** (Free/Mobile electrons)
25. **The Duplet rule refers to having _____ electrons in the valence shell.** (Two)
26. **Which is stronger: Intermolecular forces or Chemical bonds?** (Chemical bonds)
27. **A lone pair of electrons is a pair that:** (Is not involved in bonding)
28. **Compound formed by coordinate covalent bond is:** (NH_4^+)
29. **Electronegativity difference > 1.7 usually results in:** (Ionic bond)
30. **Which element is the most electronegative?** (Fluorine)

Physics Chapter 5: States of Matter

1. **Which state of matter has a definite shape and a definite volume?**
    - A) Gas
    - B) Liquid
    - C) Solid
    - D) Plasma
2. **The process by which a solid changes directly into a gas is called:**
    - A) Evaporation
    - B) Condensation
    - C) Sublimation

- D) Melting

3. **The fourth state of matter, consisting of ionized gas, is:**
   - A) Solid
   - B) Liquid
   - C) Plasma
   - D) Gas
4. **According to the Kinetic Molecular Theory, particles in a gas are:**
   - A) Close together and stationary
   - B) Far apart and in constant random motion
   - C) Arranged in a fixed lattice
   - D) Overlapping each other
5. **Pressure is defined as force per unit:**
   - A) Volume
   - B) Mass
   - C) Area
   - D) Time
6. **The SI unit of pressure is the:**
   - A) Newton
   - B) Pascal
   - C) Joule
   - D) Watt
7. **The temperature at which a liquid changes into a gas is its:**
   - A) Freezing point
   - B) Melting point
   - C) Boiling point
   - D) Critical point
8. **Atmospheric pressure at sea level is approximately:**
   - A) 101,325 Pa
   - B) 50,000 Pa
   - C) 200,000 Pa
   - D) 10,000 Pa
9. **Density is defined as the ratio of:**
   - A) Weight to Volume
   - B) Mass to Area
   - C) Mass to Volume
   - D) Force to Mass
10. **Liquids and gases are collectively known as:**
    - A) Solutes
    - B) Fluids
    - C) Crystals
    - D) Vapors
11. **The resistance of a liquid to flow is called:** (Viscosity)
12. **Molecules in a solid move by:** (Vibrating about fixed positions)
13. **Surface tension is a property of:** (Liquids)
14. **When a gas is cooled, it changes into a liquid through:** (Condensation)
15. **The SI unit of density is:** (kg/m^3)

16. **Diffusion occurs fastest in:** (Gases)
17. **A barometer is used to measure:** (Atmospheric pressure)
18. **Solids with a regular, repeating pattern of atoms are:** (Crystalline)
19. **Solids without a regular shape are called:** (Amorphous)
20. **Evaporation is a _____ process.** (Cooling)
21. **Gas pressure is caused by _____ of molecules with container walls.** (Collisions)
22. **Thermal expansion is generally greatest in:** (Gases)
23. **The density of water is:** (1000 kg/m^3 or 1 g/cm^3)
24. **Standard temperature and pressure is abbreviated as:** (STP)
25. **Plasma is found in:** (Stars/Neon signs)
26. **Which law relates the pressure and volume of a gas?** (Boyle's Law)
27. **What happens to the volume of a gas if the temperature increases?** (It increases)
28. **Hydraulic machines work on _____ Law.** (Pascal's)
29. **Upward force exerted by a fluid is:** (Buoyancy)
30. **Melting point of ice is:** (0°C / 273K)

Chemistry Chapter 5: Physical States of Matter (Gas & Liquid Laws)

1. **Which gas law states that at constant temperature, volume is inversely proportional to pressure?**
    - A) Charles's Law
    - B) Boyle's Law
    - C) Avogadro's Law
    - D) Graham's Law
2. **Absolute zero is equal to:**
    - A) 0°C
    - B) -273.15°C
    - C) 100°C
    - D) 273K
3. **According to Charles's Law, volume is directly proportional to:**
    - A) Pressure
    - B) Density
    - C) Absolute Temperature
    - D) Number of moles
4. **The spontaneous mixing of particles of different substances is called:**
    - A) Effusion
    - B) Diffusion
    - C) Evaporation
    - D) Distillation
5. **The pressure exerted by the vapors of a liquid at equilibrium is:**
    - A) Atmospheric pressure
    - B) Vapor pressure
    - C) Standard pressure
    - D) Partial pressure

6. **Vapor pressure of a liquid increases with an increase in:**
    - A) Surface area
    - B) Volume
    - C) Temperature
    - D) Humidity
7. **Liquids with strong intermolecular forces have:**
    - A) High vapor pressure
    - B) Low boiling points
    - C) High boiling points
    - D) Low viscosity
8. **The boiling point of a liquid is the temperature where vapor pressure equals:**
    - A) Zero
    - B) Internal pressure
    - C) External/Atmospheric pressure
    - D) 100 Pa
9. **Standard pressure in 'mm Hg' is:**
    - A) 100
    - B) 760
    - C) 1013
    - D) 273
10. **Diffusion of a gas through a tiny hole into a vacuum is:**
    - A) Infusion
    - B) Effusion
    - C) Fusion
    - D) Sublimation
11. **The boiling point of water at 1 atm is:** (100°C)
12. **Gases can be compressed because they have:** (Large intermolecular spaces)
13. **Boyle's Law equation is:** ($P_1V_1 = P_2V_2$)
14. **Charles's Law equation is:** ($V_1/T_1 = V_2/T_2$)
15. **Ideal gas constant is represented by:** (R)
16. **Most gases behave ideally at _____ pressure.** (Low)
17. **The process of converting gas to liquid by increasing pressure is:** (Liquefaction)
18. **Mobile phase of matter includes:** (Liquids and Gases)
19. **Intermolecular forces in gases are:** (Negligible/Very weak)
20. **Is evaporation a spontaneous process?** (Yes)
21. **Unit of temperature used in gas law calculations must be:** (Kelvin)
22. **What instrument measures gas pressure in a laboratory?** (Manometer)
23. **Vapor pressure is independent of the _____ of the liquid.** (Amount/Volume)
24. **Gases are less dense than liquids.** (True)
25. **Kinetic energy of molecules is highest in which state?** (Gas)
26. **What is the value of 1 atmosphere in Pascals?** (101,325 Pa)
27. **Rate of diffusion depends on the _____ of the gas.** (Molar mass)
28. **At constant pressure, if T is doubled, V will:** (Double)
29. **Non-polar liquids usually have _____ boiling points.** (Lower)
30. **Distillation is used to separate liquids based on their:** (Boiling points)

Continuing through the **Applied Sciences - I** curriculum, here are 30 MCQs each for the next set of chapters focusing on the behavior of solutions and thermal properties of matter.

Physics Chapter 6: Heat and Temperature

1. **The measure of the average kinetic energy of the particles in a substance is:**
    - A) Heat
    - B) Temperature
    - C) Internal Energy
    - D) Specific Heat
2. **The transfer of thermal energy from a hot body to a cold body is called:**
    - A) Temperature
    - B) Radiation
    - C) Heat
    - D) Convection
3. **The SI unit of temperature is:**
    - A) Celsius
    - B) Fahrenheit
    - C) Kelvin
    - D) Joule
4. **At what temperature do the Celsius and Fahrenheit scales show the same reading?**
    - A) 0°
    - B) 100°
    - C) -40°
    - D) 32°
5. **The transfer of heat through direct contact of particles in solids is:**
    - A) Conduction
    - B) Convection
    - C) Radiation
    - D) Insulation
6. **The process of heat transfer by the actual movement of molecules in fluids (liquids/gases) is:**
    - A) Conduction
    - B) Convection
    - C) Radiation
    - D) Absorption
7. **Heat from the Sun reaches the Earth through:**
    - A) Conduction
    - B) Convection
    - C) Radiation
    - D) Advection
8. **Which of the following is the best conductor of heat?**
    - A) Wood
    - B) Plastic

    - C) Copper
    - D) Glass
9. **The amount of heat required to raise the temperature of 1 kg of a substance by 1 K is its:**
    - A) Latent heat
    - B) Specific heat capacity
    - C) Heat of fusion
    - D) Thermal conductivity
10. **Water has a maximum density at:**
    - A) 0°C
    - B) 4°C
    - C) 100°C
    - D) -4°C
11. **The boiling point of water on the Fahrenheit scale is:** (212°F)
12. **The freezing point of water on the Kelvin scale is:** (273.15 K)
13. **Substances that do not allow heat to pass through them easily are:** (Insulators)
14. **Bimetallic strips work based on the principle of:** (Thermal expansion)
15. **The heat required to change a solid into a liquid without a change in temperature is:** (Latent heat of fusion)
16. **A vacuum flask prevents heat loss by:** (Conduction, Convection, and Radiation)
17. **Which color is the best absorber and radiator of heat?** (Black)
18. **Land and sea breezes are caused by:** (Convection currents)
19. **An instrument used to measure temperature is a:** (Thermometer)
20. **The normal human body temperature is approximately:** (37°C or 98.6°F)
21. **Specific heat of water is:** (4200 J/kg·K)
22. **What happens to the volume of most substances when heated?** (Increases/Expands)
23. **Evaporation causes a decrease in:** (Temperature/Cooling)
24. **The formula to convert Celsius to Kelvin is:** (K = C + 273)
25. **Steam causes more severe burns than boiling water because of:** (Latent heat of vaporization)
26. **In which state of matter is conduction the primary mode of heat transfer?** (Solids)
27. **Radiation can travel through a:** (Vacuum)
28. **Thermal equilibrium means two bodies have the same:** (Temperature)
29. **Which scale of temperature has no negative values?** (Kelvin)
30. **What is the SI unit of heat?** (Joule)

Chemistry Chapter 6: Solutions and Suspensions

1. **A homogeneous mixture of two or more substances is called a:**
    - A) Suspension
    - B) Solution
    - C) Compound
    - D) Colloid
2. **The substance present in smaller quantity in a solution is the:**

- A) Solvent
- B) Solute
- C) Saturated mass
- D) Precipitate

3. **A solution that can dissolve more solute at a given temperature is:**
   - A) Saturated
   - B) Supersaturated
   - C) Unsaturated
   - D) Concentrated
4. **A solution in which water is the solvent is called an:**
   - A) Ether solution
   - B) Aqueous solution
   - C) Alcoholic solution
   - D) Organic solution
5. **Which of the following is a "Universal Solvent"?**
   - A) Alcohol
   - B) Benzene
   - C) Water
   - D) Petrol
6. **The percentage of mass of solute in 100 grams of solution is:**
   - A) Molarity
   - B) Percentage w/w
   - C) Molality
   - D) Normality
7. **The number of moles of solute dissolved in 1 dm^3 (1 liter) of solution is:**
   - A) Molality
   - B) Molarity
   - C) Mole fraction
   - D) Parts per million
8. **A solution containing a very small amount of solute is:**
   - A) Concentrated
   - B) Dilute
   - C) Saturated
   - D) Standard
9. **A heterogeneous mixture where solute particles are large enough to be seen is a:**
   - A) True solution
   - B) Colloid
   - C) Suspension
   - D) Alloy
10. **The solubility of most solid solutes in water _____ with an increase in temperature.**
    - A) Decreases
    - B) Remains same
    - C) Increases
    - D) Fluctuates
11. **What type of solution is brass?** (Solid-in-solid / Alloy)

12. **Mist and fog are examples of:** (Colloids)
13. **A solution that contains the maximum amount of solute at a specific temperature is:** (Saturated)
14. **The scattering of light by particles in a colloid is called the:** (Tyndall Effect)
15. **Which mixture shows the property of settling down upon standing?** (Suspension)
16. **Molarity is represented by the symbol:** (M)
17. **What is the molarity of a solution with 1 mole of solute in 1 liter?** (1 M)
18. **"Like dissolves like" refers to the _____ of solute and solvent.** (Polarity)
19. **An example of a gas-in-gas solution is:** (Air)
20. **Non-polar solutes are soluble in:** (Non-polar solvents)
21. **Sugar in water is an example of a _____ solution.** (Solid-in-liquid)
22. **The process of adding more solvent to a solution is:** (Dilution)
23. **Is blood a true solution or a colloid?** (Colloid/Suspension)
24. **The unit of molarity is:** (mol/dm^3 or mol/L)
25. **Solubility of gases in liquids usually _____ as temperature increases.** (Decreases)
26. **Which of the following can be separated by simple filtration?** (Suspension)
27. **Tincture of iodine uses _____ as a solvent.** (Alcohol)
28. **In a salt solution, salt is the _____ and water is the _____.** (Solute, Solvent)
29. **Solubility is usually expressed as grams of solute per _____ g of solvent.** (100)
30. **A standard solution is one whose _____ is exactly known.** (Concentration)

Physics Chapter 7: Electricity

1. **The flow of electric charge is called:**
    - A) Voltage
    - B) Electric Current
    - C) Resistance
    - D) Capacitance
2. **The SI unit of electric current is the:**
    - A) Volt
    - B) Ohm
    - C) Ampere
    - D) Watt
3. **Materials that allow electric current to pass through them easily are:**
    - A) Insulators
    - B) Semiconductors
    - C) Conductors
    - D) Electrolytes
4. **The opposition offered by a substance to the flow of current is:**
    - A) Conductance
    - B) Resistance
    - C) Potential difference
    - D) Inductance
5. **The SI unit of resistance is the:**
    - A) Ampere
    - B) Volt

- C) Ohm
- D) Coulomb

6. **Ohm's Law is mathematically expressed as:**
   - A) P = VI
   - B) V = IR
   - C) Q = It
   - D) W = QV
7. **An instrument used to measure electric current in a circuit is:**
   - A) Voltmeter
   - B) Ohmmeter
   - C) Ammeter
   - D) Galvanometer
8. **In a series circuit, the _____ remains the same through all components.**
   - A) Voltage
   - B) Resistance
   - C) Current
   - D) Power
9. **The unit of electric charge is the:**
   - A) Ampere
   - B) Coulomb
   - C) Joule
   - D) Volt
10. **A device that converts chemical energy into electrical energy is a:**
    - A) Motor
    - B) Generator
    - C) Battery/Cell
    - D) Transformer
11. **Electric potential difference is measured in:** (Volts)
12. **In a parallel circuit, the _____ remains the same across all branches.** (Voltage)
13. **A safety device that breaks the circuit if the current is too high is a:** (Fuse)
14. **The "live" wire in a standard plug is usually colored:** (Brown/Red)
15. **The "neutral" wire in a standard plug is usually colored:** (Blue/Black)
16. **Power in an electric circuit is calculated as:** (P = VI)
17. **Which law relates heat produced in a conductor to the current?** (Joule's Law)
18. **The SI unit of electrical energy is:** (Joule)
19. **Commercial unit of electrical energy is:** (Kilowatt-hour)
20. **A voltmeter is always connected in _____ with the component.** (Parallel)
21. **An ammeter is always connected in _____ with the circuit.** (Series)
22. **Resistance of a wire _____ with an increase in length.** (Increases)
23. **Resistance of a wire _____ with an increase in cross-sectional area.** (Decreases)
24. **Good insulators include:** (Rubber, Glass, Plastic)
25. **The charge of an electron is:** (Negative)
26. **Electrons flow from _____ potential to _____ potential.** (Lower to Higher)
27. **Conventional current flows from _____ to _____.** (Positive to Negative)
28. **A closed path through which current flows is an:** (Electric Circuit)
29. **What is the resistance of an ideal ammeter?** (Zero)

30. **What is the resistance of an ideal voltmeter?** (Infinite)

Chemistry Chapter 7: Water, Acids, Bases, and Salts

1. **Pure water is a _____ conductor of electricity.**
   - A) Good
   - B) Poor
   - C) Super
   - D) Perfect
2. **According to Arrhenius, an acid is a substance that produces _____ in water.**
   - A) OH^- ions
   - B) H^+ ions
   - C) Cl^- ions
   - D) Na^+ ions
3. **A base is a substance that produces _____ in aqueous solution.**
   - A) Hydrogen ions
   - B) Hydroxide (OH^-) ions
   - C) Oxygen ions
   - D) Neutrons
4. **The pH of a neutral solution (like pure water) is:**
   - A) 0
   - B) 14
   - C) 7
   - D) 1
5. **Acids turn blue litmus paper:**
   - A) Green
   - B) Red
   - C) Yellow
   - D) Colorless
6. **Bases have a _____ taste.**
   - A) Sour
   - B) Sweet
   - C) Bitter
   - D) Salty
7. **The reaction between an acid and a base to form salt and water is:**
   - A) Oxidation
   - B) Reduction
   - C) Neutralization
   - D) Sublimation
8. **Which of the following is a strong acid?**
   - A) Citric acid
   - B) Acetic acid
   - C) Hydrochloric acid (HCl)
   - D) Carbonic acid

9. **The pH scale ranges from:**
    - A) 1 to 10
    - B) 0 to 14
    - C) -7 to +7
    - D) 1 to 100
10. **A solution with a pH of 3 is:**
    - A) Highly acidic
    - B) Highly basic
    - C) Neutral
    - D) Weakly basic
11. **Phenolphthalein indicator turns _____ in a basic solution.** (Pink)
12. **Sodium Hydroxide (NaOH) is a common:** (Base/Alkali)
13. **Water that forms a rich lather with soap easily is called:** (Soft water)
14. **Hardness of water is caused by salts of:** (Calcium and Magnesium)
15. **Temporary hardness of water can be removed by:** (Boiling)
16. **Permanent hardness of water is removed by adding:** (Washing soda/Ion exchange)
17. **Which gas is produced when an acid reacts with a metal?** (Hydrogen)
18. **The pH of human blood is approximately:** (7.4)
19. **An acid found in vinegar is:** (Acetic acid)
20. **An acid found in citrus fruits is:** (Citric acid)
21. **Bases that are soluble in water are called:** (Alkalis)
22. **Magnesium hydroxide is commonly used as an:** (Antacid)
23. **The formula for Sulfuric Acid is:** (H_2SO_4)
24. **Methyl orange turns _____ in acidic solutions.** (Red/Pink)
25. **Universal indicator is used to find the _____ of a solution.** (Exact pH)
26. **Water is a polar molecule because of its _____ shape.** (Bent/V-shaped)
27. **"Heavy Water" contains an isotope of hydrogen called:** (Deuterium)
28. **Acids have a _____ taste.** (Sour)
29. **Which substance is used to test for the presence of CO_2?** (Limewater)
30. **The salt formed by HCl and NaOH is:** (Sodium Chloride - NaCl)

Physics Chapter 8: Light and Optics

1. **A substance through which light can pass easily is called:**
    - A) Opaque
    - B) Translucent
    - C) Transparent
    - D) Reflective
2. **The bouncing back of light when it strikes a smooth surface is:**
    - A) Refraction
    - B) Reflection
    - C) Diffraction
    - D) Dispersion
3. **According to the Law of Reflection, the angle of incidence is always:**
    - A) Greater than the angle of reflection
    - B) Less than the angle of reflection

- C) Equal to the angle of reflection
- D) Double the angle of reflection

4. **A mirror with a reflecting surface that curves inward is a:**
   - A) Convex mirror
   - B) Plane mirror
   - C) Concave mirror
   - D) Cylindrical mirror
5. **The bending of light as it passes from one transparent medium to another is:**
   - A) Reflection
   - B) Refraction
   - C) Absorption
   - D) Polarization
6. **The speed of light in a vacuum is approximately:**
   - A) 3×10^8 m/s
   - B) 3×10^5 m/s
   - C) 150,000 m/s
   - D) 300 m/s
7. **A lens that is thicker at the center than at the edges is a:**
   - A) Diverging lens
   - B) Concave lens
   - C) Convex (Converging) lens
   - D) Plane lens
8. **The splitting of white light into its seven constituent colors is called:**
   - A) Refraction
   - B) Reflection
   - C) Dispersion
   - D) Total internal reflection
9. **The point where parallel rays of light meet after passing through a convex lens is the:**
   - A) Optical center
   - B) Principal focus
   - C) Pole
   - D) Radius of curvature
10. **Which color of light bends the most during dispersion through a prism?**
    - A) Red
    - B) Yellow
    - C) Green
    - D) Violet
11. **The SI unit of the power of a lens is:** (Dioptre)
12. **A convex mirror always forms a _____ image.** (Virtual, erect, and diminished)
13. **The image formed on the retina of a human eye is:** (Real and inverted)
14. **Short-sightedness (Myopia) is corrected using a:** (Concave lens)
15. **Long-sightedness (Hyperopia) is corrected using a:** (Convex lens)
16. **The ratio of the speed of light in vacuum to the speed in a medium is:** (Refractive Index)
17. **A magnifying glass consists of a simple:** (Convex lens)

18. **Total internal reflection occurs when the angle of incidence is greater than the:** (Critical angle)
19. **Optical fibers work on the principle of:** (Total internal reflection)
20. **The distance between the optical center and the principal focus is:** (Focal length)
21. **Which mirror is used as a rear-view mirror in vehicles?** (Convex mirror)
22. **The center of the sphere of which the mirror is a part is called:** (Center of curvature)
23. **Rays parallel to the principal axis of a concave mirror pass through _____ after reflection.** (Focus)
24. **A real image can be obtained on a:** (Screen)
25. **The refractive index of water is approximately:** (1.33)
26. **Which color of light has the longest wavelength?** (Red)
27. **An instrument used to see distant objects is a:** (Telescope)
28. **The change in the path of light due to a change in medium is:** (Refraction)
29. **Rainbow formation is due to:** (Dispersion and total internal reflection in water drops)
30. **Power of a lens is the _____ of its focal length.** (Reciprocal)

Chemistry Chapter 8: Introduction to Organic Chemistry & Biochemistry

1. **Organic chemistry is the study of compounds containing:**
    - A) Oxygen
    - B) Carbon
    - C) Nitrogen
    - D) Sulfur
2. **Compounds containing only carbon and hydrogen atoms are called:**
    - A) Carbohydrates
    - B) Hydrocarbons
    - C) Oxides
    - D) Polymers
3. **The simplest hydrocarbon is:**
    - A) Ethane
    - B) Methane
    - C) Propane
    - D) Benzene
4. **Hydrocarbons containing only single bonds between carbon atoms are:**
    - A) Alkenes
    - B) Alkynes
    - C) Alkanes
    - D) Aromatics
5. **The general formula for Alkanes is:**
    - A) CnH2n
    - B) CnH2n+2
    - C) CnH2n-2
    - D) CnHn
6. **Which of the following is a "Macromolecule" essential for life?**

- A) Methane
- B) Water
- C) Protein
- D) Sodium Chloride

7. **Proteins are made up of long chains of:**
   - A) Glucose
   - B) Fatty acids
   - C) Amino acids
   - D) Nucleotides
8. **The main source of energy for the human body is:**
   - A) Proteins
   - B) Vitamins
   - C) Carbohydrates
   - D) Minerals
9. **Which of the following is a polysaccharide?**
   - A) Glucose
   - B) Fructose
   - C) Sucrose
   - D) Starch
10. **Lipids (fats and oils) are composed of:**
    - A) Amino acids
    - B) Fatty acids and glycerol
    - C) Simple sugars
    - D) Nitrogen bases
11. **The chemical formula for Methane is:** (CH_4)
12. **Alkenes contain at least one _____ bond.** (Double)
13. **Alkynes contain at least one _____ bond.** (Triple)
14. **The process of breaking down large food molecules into smaller ones is:** (Digestion)
15. **Enzymes are biological catalysts made of:** (Proteins)
16. **The sugar found in fruits is mainly:** (Fructose)
17. **Cane sugar (table sugar) is chemically known as:** (Sucrose)
18. **Vitamin C is also known as:** (Ascorbic acid)
19. **Which vitamin is synthesized by the body in the presence of sunlight?** (Vitamin D)
20. **Night blindness is caused by a deficiency of:** (Vitamin A)
21. **Scurvy is caused by a deficiency of:** (Vitamin C)
22. **DNA and RNA are types of:** (Nucleic acids)
23. **The functional group -OH represents:** (Alcohols)
24. **The functional group -COOH represents:** (Carboxylic acids)
25. **Hemoglobin is a protein that carries _____ in the blood.** (Oxygen)
26. **Glucose is a _____ saccharide.** (Mono)
27. **Rickets is a disease related to the deficiency of:** (Vitamin D / Calcium)
28. **Vegetable oils are generally _____ at room temperature.** (Liquid)
29. **Animal fats are generally _____ at room temperature.** (Solid)
30. **The basic unit of heredity is found in:** (DNA)

Physics Chapter 9: Modern Physics & Radioactivity

1. **The spontaneous emission of radiation from the nucleus of an atom is called:**
    - A) Fusion
    - B) Fission
    - C) Radioactivity
    - D) Ionization
2. **Who discovered the phenomenon of radioactivity?**
    - A) Albert Einstein
    - B) Henri Becquerel
    - C) Marie Curie
    - D) Ernest Rutherford
3. **An alpha (α) particle is identical to the nucleus of:**
    - A) Hydrogen
    - B) Helium
    - C) Carbon
    - D) Oxygen
4. **Beta (β) particles are actually high-speed:**
    - A) Protons
    - B) Neutrons
    - C) Electrons
    - D) Photons
5. **Which type of radiation has the highest penetrating power?**
    - A) Alpha rays
    - B) Beta rays
    - C) Gamma (γ) rays
    - D) X-rays
6. **The time required for half of the radioactive nuclei in a sample to decay is called:**
    - A) Mean life
    - B) Decay constant
    - C) Half-life
    - D) Full life
7. **The splitting of a heavy nucleus into two smaller nuclei is called:**
    - A) Nuclear Fusion
    - B) Nuclear Fission
    - C) Alpha decay
    - D) Chemical reaction
8. **The process where two light nuclei combine to form a heavier nucleus is:**
    - A) Fission
    - B) Fusion
    - C) Ionization
    - D) Combustion
9. **X-rays were discovered by:**
    - A) Newton
    - B) Roentgen
    - C) Dalton
    - D) Bohr
10. **Which radiation carries no electric charge?**

- A) Alpha
- B) Beta
- C) Gamma
- D) Cathode rays

11. **The charge on an Alpha particle is:** (+2)
12. **The charge on a Beta particle is:** (-1)
13. **Radiation used to sterilize medical equipment is usually:** (Gamma rays)
14. **The energy of a photon is given by the formula:** (E = hf)
15. **Which instrument is used to detect radiation?** (Geiger-Muller Counter)
16. **Isotopes used in medical diagnosis are called:** (Radioisotopes/Tracers)
17. **Radioactivity is a property of the:** (Nucleus)
18. **The unit of radioactivity is the:** (Becquerel or Curie)
19. **Nuclear reactors use controlled _____ to generate electricity.** (Fission)
20. **Which particles are the least penetrating?** (Alpha rays)
21. **X-rays are used in hospitals to detect:** (Bone fractures)
22. **The fuel used in most nuclear reactors is:** (Uranium-235)
23. **Carbon-14 dating is used to find the age of:** (Fossils/Organic matter)
24. **In α-decay, the atomic number decreases by:** (2)
25. **In β-decay, the atomic number increases by:** (1)
26. **Gamma rays are a form of _____ radiation.** (Electromagnetic)
27. **Radiation therapy is used to treat:** (Cancer)
28. **The mass of a Beta particle is:** (Equal to an electron)
29. **Which lead shield is required to stop Gamma rays?** (Thick lead)
30. **The Sun produces energy through:** (Nuclear Fusion)

Chemistry Chapter 9: Analytical Chemistry & Laboratory Techniques

1. **The branch of chemistry that deals with the separation and identification of components is:**
   - A) Organic Chemistry
   - B) Inorganic Chemistry
   - C) Analytical Chemistry
   - D) Physical Chemistry
2. **A technique used to separate components of a mixture based on their different boiling points is:**
   - A) Filtration
   - B) Distillation
   - C) Chromatography
   - D) Sublimation
3. **The process of separating an insoluble solid from a liquid using a filter medium is:**
   - A) Evaporation
   - B) Filtration
   - C) Crystallization
   - D) Decantation

4. **Chromatography is used to separate components based on their different:**
    - A) Masses
    - B) Boiling points
    - C) Distribution between two phases
    - D) Magnetic properties
5. **In chromatography, the phase that does not move is the:**
    - A) Mobile phase
    - B) Stationary phase
    - C) Gas phase
    - D) Liquid phase
6. **A quantitative technique used to determine the concentration of a solution by reacting it with a standard solution is:**
    - A) Titration
    - B) Filtration
    - C) Centrifugation
    - D) Sublimation
7. **The point in a titration where the indicator changes color is the:**
    - A) Equivalence point
    - B) End point
    - C) Starting point
    - D) Neutral point
8. **Which piece of laboratory equipment is used to deliver a precise volume of liquid during titration?**
    - A) Beaker
    - B) Conical flask
    - C) Burette
    - D) Measuring cylinder
9. **A solution of exactly known concentration is called a:**
    - A) Saturated solution
    - B) Standard solution
    - C) Dilute solution
    - D) Ideal solution
10. **The technique used to purify solids by dissolving them in a hot solvent and cooling them is:**
    - A) Distillation
    - B) Crystallization
    - C) Filtration
    - D) Chromatography
11. **Paper chromatography is a type of:** (Partition/Adsorption Chromatography)
12. **The substance used to detect the end point of a titration is an:** (Indicator)
13. **Titration between an acid and a base is a _____ reaction.** (Neutralization)
14. **Which indicator is commonly used for strong acid-strong base titrations?** (Phenolphthalein or Methyl Orange)
15. **The process of spinning a mixture at high speed to separate solids is:** (Centrifugation)
16. **Solvent extraction is based on the _____ of a solute in two immiscible liquids.** (Solubility)

17. **A desiccator is used to:** (Dry a substance or keep it dry)
18. **The apparatus used to measure a fixed volume of liquid (e.g., 10ml) is a:** (Pipette)
19. **Molarity (M) is a common unit for expressing:** (Concentration)
20. **What is the color of Phenolphthalein in an acidic medium?** (Colorless)
21. **What is the color of Phenolphthalein in a basic medium?** (Pink)
22. **Analytical chemistry is divided into _____ and _____ analysis.** (Qualitative and Quantitative)
23. **Qualitative analysis tells us _____ is present in a sample.** (What/Which substance)
24. **Quantitative analysis tells us _____ of a substance is present.** (How much/Amount)
25. **Impure solids are often purified by:** (Recrystallization)
26. **The liquid that passes through the filter paper is the:** (Filtrate)
27. **The solid left on the filter paper is the:** (Residue)
28. **Rf value in chromatography stands for:** (Retention factor / Retardation factor)
29. **Burette readings should be taken at the _____ of the meniscus for clear liquids.** (Lower)
30. **Water is often purified for lab use by:** (Deionization or Distillation)

Physics Chapter 10: Magnetism and Electromagnetism

1. **A substance that attracts iron and produces a magnetic field is called a:**
    - A) Conductor
    - B) Magnet
    - C) Insulator
    - D) Semiconductor
2. **The region around a magnet where its influence can be felt is the:**
    - A) Electric field
    - B) Gravitational field
    - C) Magnetic field
    - D) Nuclear field
3. **Like magnetic poles _____ each other, while unlike poles _____ each other.**
    - A) Attract, Repel
    - B) Repel, Attract
    - C) Neutralize, Repel
    - D) Attract, Neutralize
4. **A freely suspended magnet always points in which direction?**
    - A) East-West
    - B) North-South
    - C) Up-Down
    - D) Randomly
5. **A temporary magnet made by passing electric current through a coil is a/an:**
    - A) Permanent magnet
    - B) Bar magnet
    - C) Electromagnet
    - D) Natural magnet
6. **The process of generating electricity by moving a conductor through a magnetic field is:**

- A) Conduction
- B) Electromagnetic Induction
- C) Thermionic emission
- D) Magnetization

7. **A device that converts mechanical energy into electrical energy is a:**
   - A) Motor
   - B) Generator
   - C) Transformer
   - D) Battery
8. **A device that converts electrical energy into mechanical energy is a:**
   - A) Generator
   - B) Motor
   - C) Rectifier
   - D) Capacitor
9. **A transformer is used to change the levels of:**
   - A) Resistance
   - B) Direct Current (DC)
   - C) Alternating Voltage (AC)
   - D) Power
10. **The SI unit of magnetic flux density is the:**
    - A) Weber
    - B) Tesla
    - C) Henry
    - D) Farad
11. **Soft iron is used to make electromagnets because it:** (Loses magnetism quickly)
12. **Magnetic lines of force originate from the _____ pole.** (North)
13. **Which rule is used to find the direction of magnetic field around a wire?** (Right-hand grip rule)
14. **A solenoid acts like a _____ when current passes through it.** (Bar magnet)
15. **Increasing the number of turns in a coil _____ the magnetic field.** (Increases)
16. **Earth behaves like a giant magnet with its magnetic South pole near the _____ pole.** (Geographic North)
17. **Magnetic field lines _____ each other.** (Never cross)
18. **A transformer with more turns in the secondary coil than the primary is a:** (Step-up transformer)
19. **Transformers work only with _____ current.** (Alternating/AC)
20. **The core of a transformer is usually _____ to reduce energy loss.** (Laminated)
21. **The strength of an electromagnet depends on current and _____ .** (Number of turns)
22. **What happens to the poles of a magnet if it is broken in half?** (Each half becomes a full magnet)
23. **The space where magnetic lines are closest together represents a _____ field.** (Strong)
24. **Which material is non-magnetic?** (Aluminum/Copper/Wood)
25. **Lenz's Law is related to the law of conservation of _____ .** (Energy)
26. **Galvanometer is used to _____ current.** (Detect/Measure small)
27. **Direct Current (DC) flows in _____ direction.** (One)

28. **The primary and secondary coils of a transformer are _____ linked.** (Magnetically)
29. **Step-down transformers _____ voltage.** (Decrease)
30. **Relays are switches operated by _____ .** (Electromagnets)

P**Physics Chapter 12: Gas Laws and Kinetic Theory**

1. **Which law states that the volume of a given mass of gas is inversely proportional to its pressure at constant temperature?**
    - A) Charles's Law
    - B) Boyle's Law
    - C) Avogadro's Law
    - D) Newton's Law
2. **The mathematical expression for Boyle's Law is:**
    - A) $V/T = k$
    - B) $P/V = k$
    - C) $PV = k$
    - D) $P + V = k$
3. **According to Charles's Law, the volume of a gas is directly proportional to its absolute temperature if the _____ is kept constant.**
    - A) Volume
    - B) Pressure
    - C) Density
    - D) Mass
4. **The temperature -273.15 °C is known as:**
    - A) Normal temperature
    - B) Absolute zero
    - C) Boiling point
    - D) Standard temperature
5. **The Ideal Gas Equation is represented by:**
    - A) $PV = nRT$
    - B) $P = VRT$
    - C) $V = PRT$
    - D) $PV = n/RT$
6. **In the equation PV = nRT, the letter 'R' stands for:**
    - A) Ratio
    - B) Ideal Gas Constant
    - C) Radiation
    - D) Resistance
7. **Standard Temperature and Pressure (STP) conditions are:**
    - A) 0 °C and 1 atm
    - B) 100 °C and 1 atm
    - C) 25 °C and 2 atm

- D) 0 K and 1 atm

8. **Kinetic Molecular Theory assumes that gas molecules are in constant _____ motion.**
   - A) Circular
   - B) Random
   - C) Vibrational
   - D) Fixed
9. **The pressure exerted by a gas is due to the _____ of its molecules with the walls of the container.**
   - A) Friction
   - B) Collisions
   - C) Attraction
   - D) Repulsion
10. **The process by which gas molecules spread from a region of high concentration to low concentration is:**
    - A) Effusion
    - B) Diffusion
    - C) Condensation
    - D) Evaporation
11. **Boyle's Law is applicable only when _____ is constant.** (Temperature)
12. **Charles's Law is applicable only when _____ is constant.** (Pressure)
13. **To convert Celsius to Kelvin, you add _____ to the Celsius temperature.** (273)
14. **If the pressure of a gas is doubled at constant temperature, its volume becomes _____ .** (Half)
15. **The average kinetic energy of gas molecules is directly proportional to its _____ .** (Absolute Temperature)
16. **Gases deviate from ideal behavior at _____ pressure.** (High)
17. **Which gas law relates volume and the number of moles?** (Avogadro's Law)
18. **The unit of pressure "torr" is equal to _____ mm Hg.** (1)
19. **An ideal gas is a theoretical gas that obeys _____ .** (All gas laws)
20. **When a gas is heated in a closed container, the pressure _____ .** (Increases)
21. **Diffusion of gases is faster than liquids because gas molecules have _____ .** (Higher speeds/Large spaces)
22. **The volume of 1 mole of an ideal gas at STP is _____ dm^3.** (22.4)
23. **The SI unit of temperature used in gas law calculations is _____ .** (Kelvin)
24. **A real gas behaves most like an ideal gas at _____ pressure and _____ temperature.** (Low, High)
25. **The "Manometer" is an instrument used to measure _____ .** (Gas pressure)
26. **Which law is used to explain why a balloon shrinks when placed in a freezer?** (Charles's Law)
27. **The constant 'R' has the value _____ L·atm/K·mol.** (0.0821)
28. **Molecular motion stops completely at _____ .** (Absolute zero / 0 K)
29. **Gases have low density because their molecules are _____ .** (Far apart)
30. **Compressed gases are stored in cylinders because they have high _____ .** (Compressibility)

Chemistry Chapter 12: Practical Volumetric Analysis (Titrations)

1. **Volumetric analysis is a method to determine the concentration of a substance by measuring the _____ of a solution.**
    - A) Mass
    - B) Volume
    - C) Temperature
    - D) Pressure
2. **In a titration, the solution of known concentration is called the:**
    - A) Analyte
    - B) Titrant / Standard solution
    - C) Indicator
    - D) Filtrate
3. **The apparatus used to deliver the titrant drop by drop is the:**
    - A) Pipette
    - B) Beaker
    - C) Burette
    - D) Graduated cylinder
4. **A pipette is used to measure and transfer a _____ volume of liquid.**
    - A) Variable
    - B) Fixed/Precise
    - C) Large
    - D) Random
5. **The reaction between $KMnO_4$ and $FeSO_4$ in an acidic medium is a/an:**
    - A) Acid-Base reaction
    - B) Redox (Oxidation-Reduction) reaction
    - C) Precipitation reaction
    - D) Hydrolysis reaction
6. **In a titration involving $KMnO_4$, the $KMnO_4$ acts as a:**
    - A) Reducing agent
    - B) Oxidizing agent
    - C) Catalyst
    - D) Solvent
7. **$KMnO_4$ is often called a "self-indicator" because it:**
    - A) Never changes color
    - B) Changes color at the end point without adding another chemical
    - C) Is always colorless
    - D) Reacts with any indicator
8. **The end point of a $KMnO_4$ titration in acidic medium is the appearance of a permanent _____ color.**
    - A) Blue
    - B) Yellow
    - C) Light pink
    - D) Green
9. **Which acid is commonly used to provide the acidic medium for $KMnO_4$ titrations?**
    - A) HCl

- B) Dilute H_2SO_4
- C) HNO_3
- D) Acetic acid

10. **Standardization of a solution means finding its exact:**
    - A) Boiling point
    - B) Molarity/Concentration
    - C) Volume
    - D) Color
11. **The mathematical formula used for titration calculations is:** ($M_1V_1 = M_2V_2$)
12. **The conical flask used in titrations is also called an _____ flask.** (Erlenmeyer)
13. **Before using a burette, it should be rinsed with _____ .** (The titrant/solution it will contain)
14. **The part of the liquid curve used to take a reading in a burette is the _____ .** (Meniscus)
15. **A 0.1 M solution contains 0.1 moles of solute in _____ dm^3 of solution.** (1)
16. **Why is HCl not used in $KMnO_4$ titrations?** ($KMnO_4$ oxidizes HCl to Chlorine)
17. **The molar mass of $KMnO_4$ is approximately _____ g/mol.** (158)
18. **The valency factor (n) for $KMnO_4$ in acidic medium is _____ .** (5)
19. **Titration should be stopped as soon as a _____ color change occurs.** (Permanent)
20. **The solution whose concentration is to be determined is placed in the _____ .** (Conical flask)
21. **The primary standard used to standardize $KMnO_4$ is often _____ .** (Oxalic acid or Ferrous Ammonium Sulfate)
22. **In redox titrations, oxidation and reduction occur _____ .** (Simultaneously)
23. **The "equivalence point" is the point where reactants are _____ .** (Chemically equivalent)
24. **Reading a burette at eye level avoids _____ error.** (Parallax)
25. **The weight of solute required for a specific molarity is calculated using the formula _____ .** (Mass = Molarity × Molar Mass × Volume in Liters)
26. **$KMnO_4$ turns _____ when it is reduced in acidic solution.** (Colorless/Mn^{2+})
27. **A volumetric flask is used to _____ .** (Prepare standard solutions)
28. **Is it necessary to add an external indicator in a titration between NaOH and HCl?** (Yes, e.g., Phenolphthalein)
29. **The color of $KMnO_4$ solution is _____ .** (Deep Purple)
30. **During titration, the conical flask should be _____ gently.** (Swirled)

hysics Chapter 11: Sound and Waves

1. **Sound is a form of energy that travels in the form of:**
    - A) Transverse waves
    - B) Longitudinal waves
    - C) Electromagnetic waves
    - D) Stationary waves
2. **The distance between two consecutive crests or troughs is called:**
    - A) Amplitude
    - B) Frequency

- C) Wavelength
- D) Time period

3. **The number of waves passing through a point in one second is the:**
   - A) Pitch
   - B) Frequency
   - C) Velocity
   - D) Loudness
4. **The SI unit of frequency is:**
   - A) Meter
   - B) Second
   - C) Hertz (Hz)
   - D) Decibel (dB)
5. **Sound cannot travel through a:**
   - A) Solid
   - B) Liquid
   - C) Gas
   - D) Vacuum
6. **The speed of sound is maximum in:**
   - A) Air
   - B) Water
   - C) Steel (Solids)
   - D) Vacuum
7. **The human audible frequency range is:**
   - A) 2 Hz to 200 Hz
   - B) 20 Hz to 20,000 Hz
   - C) 20,000 Hz to 50,000 Hz
   - D) Above 100,000 Hz
8. **Sound waves with frequencies above 20,000 Hz are called:**
   - A) Infrasonic
   - B) Ultrasonic
   - C) Supersonic
   - D) Subsonic
9. **The characteristic of sound that distinguishes a shrill sound from a grave one is:**
   - A) Intensity
   - B) Loudness
   - C) Pitch
   - D) Quality
10. **The reflection of sound that is heard after a delay is called a/an:**
    - A) Noise
    - B) Echo
    - C) Resonance
    - D) Interference
11. **Pitch of a sound depends on its:** (Frequency)
12. **Loudness of a sound depends on its:** (Amplitude)
13. **The speed of sound in air at room temperature is approximately:** (340 m/s)
14. **Infrasonic waves have frequencies below:** (20 Hz)

15. **Which organ in humans is responsible for producing sound?** (Larynx/Voice box)
16. **The unit used to measure the intensity level of sound is:** (Decibel)
17. **Waves produced in a stretched string are:** (Transverse)
18. **The formula relating wave speed, frequency, and wavelength is:** ($v = f\lambda$)
19. **Ultra-sonography uses which type of waves?** (Ultrasound)
20. **A sound becomes a "noise" when it is:** (Irregular and unpleasant)
21. **The maximum displacement of a particle from its mean position is:** (Amplitude)
22. **Bats navigate and find prey using:** (Echolocation/Ultrasound)
23. **The speed of sound _____ with an increase in temperature.** (Increases)
24. **Compression and Rarefaction are parts of a _____ wave.** (Longitudinal)
25. **The time taken to complete one vibration is the:** (Time period)
26. **Relationship between time period (T) and frequency (f) is:** ($f = 1/T$)
27. **Sound travels _____ in water than in air.** (Faster)
28. **Which material is best for soundproofing a room?** (Soft materials like foam or carpets)
29. **Quality (Timbre) helps us distinguish between:** (Two sounds of same pitch and loudness)
30. **Multiple reflections of sound in a large hall is called:** (Reverberation)

Chemistry Chapter 11: Applied Chemistry and Safety

1. **Which of the following is a primary nutrient for plants provided by fertilizers?**
    - A) Iron
    - B) Nitrogen
    - C) Carbon
    - D) Oxygen
2. **The percentage of Nitrogen in Urea is approximately:**
    - A) 20%
    - B) 46%
    - C) 80%
    - D) 10%
3. **The process used to separate different fractions of petroleum is:**
    - A) Simple distillation
    - B) Fractional distillation
    - C) Filtration
    - D) Sublimation
4. **The major component of Natural Gas (Sui gas) is:**
    - A) Ethane
    - B) Butane
    - C) Methane
    - D) Propane
5. **Which gas is known as "Marsh Gas"?**
    - A) CO_2
    - B) CH_4 (Methane)

- C) NH_3
- D) H_2

6. **Hard water contains high concentrations of:**
   - A) Sodium and Potassium
   - B) Calcium and Magnesium
   - C) Iron and Copper
   - D) Gold and Silver
7. **The chemical name for "Baking Soda" is:**
   - A) Sodium carbonate
   - B) Sodium bicarbonate
   - C) Sodium hydroxide
   - D) Calcium carbonate
8. **Bleaching powder is chemically represented as:**
   - A) CaO
   - B) $Ca(OH)_2$
   - C) $CaOCl_2$
   - D) $CaCl_2$
9. **A substance that changes the rate of a chemical reaction without being consumed is a:**
   - A) Reactant
   - B) Product
   - C) Catalyst
   - D) Solvent
10. **The study of the chemistry of living organisms is:**
    - A) Industrial Chemistry
    - B) Biochemistry
    - C) Nuclear Chemistry
    - D) Environmental Chemistry
11. **PVC stands for:** (Polyvinyl Chloride)
12. **The main raw material for making glass is:** (Silica/Sand)
13. **Cement is primarily a mixture of silicates and aluminates of:** (Calcium)
14. **LPG stands for:** (Liquefied Petroleum Gas)
15. **Which chemical is used to disinfect water and kill germs?** (Chlorine)
16. **The pH of an alkaline solution is:** (Greater than 7)
17. **Organic compounds that are the building blocks of proteins are:** (Amino acids)
18. **The formula for Caustic Soda is:** (NaOH)
19. **Which acid is found in the human stomach to help digestion?** (Hydrochloric Acid)
20. **A "Standard Solution" is one whose _____ is known.** (Concentration/Molarity)
21. **The process of turning vegetable oil into ghee is:** (Hydrogenation)
22. **Plaster of Paris is made from:** (Gypsum)
23. **The most common solvent in a laboratory is:** (Distilled water)
24. **Which gas is used in fire extinguishers?** (Carbon dioxide)
25. **"Dry Ice" is the solid form of:** (Carbon dioxide)
26. **Which of the following is a synthetic fiber?** (Nylon/Polyester)
27. **The simplest member of the Alkyne series is:** (Acetylene/Ethyne)
28. **Corrosion of a metal is a type of _____ reaction.** (Oxidation)

29. **Which safety equipment is essential when handling strong acids?** (Gloves/Goggles)
30. **The process of adding iodine to salt is called:** (Iodization)

Physics Chapter 12: Gas Laws and Kinetic Theory

1. **Which law states that the volume of a given mass of gas is inversely proportional to its pressure at constant temperature?**
    - A) Charles's Law
    - B) Boyle's Law
    - C) Avogadro's Law
    - D) Newton's Law
2. **The mathematical expression for Boyle's Law is:**
    - A) $V/T = k$
    - B) $P/V = k$
    - C) $PV = k$
    - D) $P + V = k$
3. **According to Charles's Law, the volume of a gas is directly proportional to its absolute temperature if the _____ is kept constant.**
    - A) Volume
    - B) Pressure
    - C) Density
    - D) Mass
4. **The temperature -273.15 °C is known as:**
    - A) Normal temperature
    - B) Absolute zero
    - C) Boiling point
    - D) Standard temperature
5. **The Ideal Gas Equation is represented by:**
    - A) $PV = nRT$
    - B) $P = VRT$
    - C) $V = PRT$
    - D) $PV = n/RT$
6. **In the equation PV = nRT, the letter 'R' stands for:**
    - A) Ratio
    - B) Ideal Gas Constant
    - C) Radiation
    - D) Resistance
7. **Standard Temperature and Pressure (STP) conditions are:**
    - A) 0 °C and 1 atm
    - B) 100 °C and 1 atm
    - C) 25 °C and 2 atm
    - D) 0 K and 1 atm
8. **Kinetic Molecular Theory assumes that gas molecules are in constant _____ motion.**
    - A) Circular
    - B) Random
    - C) Vibrational

- D) Fixed

9. **The pressure exerted by a gas is due to the _____ of its molecules with the walls of the container.**
   - A) Friction
   - B) Collisions
   - C) Attraction
   - D) Repulsion
10. **The process by which gas molecules spread from a region of high concentration to low concentration is:**
   - A) Effusion
   - B) Diffusion
   - C) Condensation
   - D) Evaporation
11. **Boyle's Law is applicable only when _____ is constant.** (Temperature)
12. **Charles's Law is applicable only when _____ is constant.** (Pressure)
13. **To convert Celsius to Kelvin, you add _____ to the Celsius temperature.** (273)
14. **If the pressure of a gas is doubled at constant temperature, its volume becomes _____ .** (Half)
15. **The average kinetic energy of gas molecules is directly proportional to its _____ .** (Absolute Temperature)
16. **Gases deviate from ideal behavior at _____ pressure.** (High)
17. **Which gas law relates volume and the number of moles?** (Avogadro's Law)
18. **The unit of pressure "torr" is equal to _____ mm Hg.** (1)
19. **An ideal gas is a theoretical gas that obeys _____ .** (All gas laws)
20. **When a gas is heated in a closed container, the pressure _____ .** (Increases)
21. **Diffusion of gases is faster than liquids because gas molecules have _____ .** (Higher speeds/Large spaces)
22. **The volume of 1 mole of an ideal gas at STP is _____ dm^3.** (22.4)
23. **The SI unit of temperature used in gas law calculations is _____ .** (Kelvin)
24. **A real gas behaves most like an ideal gas at _____ pressure and _____ temperature.** (Low, High)
25. **The "Manometer" is an instrument used to measure _____ .** (Gas pressure)
26. **Which law is used to explain why a balloon shrinks when placed in a freezer?** (Charles's Law)
27. **The constant 'R' has the value _____ L·atm/K·mol.** (0.0821)
28. **Molecular motion stops completely at _____ .** (Absolute zero / 0 K)
29. **Gases have low density because their molecules are _____ .** (Far apart)
30. **Compressed gases are stored in cylinders because they have high _____ .** (Compressibility)

Chemistry Chapter 12: Practical Volumetric Analysis (Titrations)

1. **Volumetric analysis is a method to determine the concentration of a substance by measuring the _____ of a solution.**

- A) Mass
- B) Volume
- C) Temperature
- D) Pressure

2. **In a titration, the solution of known concentration is called the:**
   - A) Analyte
   - B) Titrant / Standard solution
   - C) Indicator
   - D) Filtrate
3. **The apparatus used to deliver the titrant drop by drop is the:**
   - A) Pipette
   - B) Beaker
   - C) Burette
   - D) Graduated cylinder
4. **A pipette is used to measure and transfer a _____ volume of liquid.**
   - A) Variable
   - B) Fixed/Precise
   - C) Large
   - D) Random
5. **The reaction between $KMnO_4$ and $FeSO_4$ in an acidic medium is a/an:**
   - A) Acid-Base reaction
   - B) Redox (Oxidation-Reduction) reaction
   - C) Precipitation reaction
   - D) Hydrolysis reaction
6. **In a titration involving $KMnO_4$, the $KMnO_4$ acts as a:**
   - A) Reducing agent
   - B) Oxidizing agent
   - C) Catalyst
   - D) Solvent
7. **$KMnO_4$ is often called a "self-indicator" because it:**
   - A) Never changes color
   - B) Changes color at the end point without adding another chemical
   - C) Is always colorless
   - D) Reacts with any indicator
8. **The end point of a $KMnO_4$ titration in acidic medium is the appearance of a permanent _____ color.**
   - A) Blue
   - B) Yellow
   - C) Light pink
   - D) Green
9. **Which acid is commonly used to provide the acidic medium for $KMnO_4$ titrations?**
   - A) HCl
   - B) Dilute H_2SO_4
   - C) HNO_3
   - D) Acetic acid
10. **Standardization of a solution means finding its exact:**

- A) Boiling point
- B) Molarity/Concentration
- C) Volume
- D) Color

11. **The mathematical formula used for titration calculations is:** ($M_1V_1 = M_2V_2$)
12. **The conical flask used in titrations is also called an _____ flask.** (Erlenmeyer)
13. **Before using a burette, it should be rinsed with _____ .** (The titrant/solution it will contain)
14. **The part of the liquid curve used to take a reading in a burette is the _____ .** (Meniscus)
15. **A 0.1 M solution contains 0.1 moles of solute in _____ dm^3 of solution.** (1)
16. **Why is HCl not used in $KMnO_4$ titrations?** ($KMnO_4$ oxidizes HCl to Chlorine)
17. **The molar mass of $KMnO_4$ is approximately _____ g/mol.** (158)
18. **The valency factor (n) for $KMnO_4$ in acidic medium is _____ .** (5)
19. **Titration should be stopped as soon as a _____ color change occurs.** (Permanent)
20. **The solution whose concentration is to be determined is placed in the _____ .** (Conical flask)
21. **The primary standard used to standardize $KMnO_4$ is often _____ .** (Oxalic acid or Ferrous Ammonium Sulfate)
22. **In redox titrations, oxidation and reduction occur _____ .** (Simultaneously)
23. **The "equivalence point" is the point where reactants are _____ .** (Chemically equivalent)
24. **Reading a burette at eye level avoids _____ error.** (Parallax)
25. **The weight of solute required for a specific molarity is calculated using the formula _____ .** (Mass = Molarity × Molar Mass × Volume in Liters)
26. **$KMnO_4$ turns _____ when it is reduced in acidic solution.** (Colorless/Mn^{2+})
27. **A volumetric flask is used to _____ .** (Prepare standard solutions)
28. **Is it necessary to add an external indicator in a titration between NaOH and HCl?** (Yes, e.g., Phenolphthalein)
29. **The color of $KMnO_4$ solution is _____ .** (Deep Purple)
30. **During titration, the conical flask should be _____ gently.** (Swirled)

Physics Chapter 14: Alternating Current

1. **A current that changes its magnitude and direction periodically is called:**
   - A) Direct Current (DC)
   - B) Alternating Current (AC)
   - C) Static Current
   - D) Constant Current
2. **The time interval after which an alternating current repeats its cycle is its:**
   - A) Frequency
   - B) Time Period
   - C) Amplitude
   - D) Phase
3. **The number of cycles completed by an AC in one second is known as its:**
   - A) Wavelength

- B) Velocity
- C) Frequency
- D) Peak value

4. **The standard frequency of AC mains supply in Pakistan is:**
   - A) 100 Hz
   - B) 60 Hz
   - C) 50 Hz
   - D) 220 Hz
5. **The maximum value reached by an alternating current or voltage in either direction is the:**
   - A) Mean value
   - B) RMS value
   - C) Peak value (Amplitude)
   - D) Instantaneous value
6. **The value of AC that produces the same heating effect as a DC of the same value is the:**
   - A) Peak value
   - B) Average value
   - C) Root Mean Square (RMS) value
   - D) Instantaneous value
7. **If the peak voltage (V0) is 100V, the RMS voltage (Vrms) is approximately:**
   - A) 100 V
   - B) 70.7 V
   - C) 50 V
   - D) 141.4 V
8. **The relationship between Vrms and peak voltage V0 is:**
   - A) $Vrms=V0/2$
   - B) $Vrms=V0\times2$
   - C) $Vrms=V0/2$
   - D) $Vrms=2V0$
9. **A device used to change the voltage of an alternating current is a:**
   - A) Commutator
   - B) Transformer
   - C) Galvanometer
   - D) Capacitor
10. **Alternating current can be transmitted over long distances with minimum power loss using:**
    - A) High voltage and low current
    - B) Low voltage and high current
    - C) Direct current only
    - D) Heavy copper wires without transformers
11. **An AC generator works on the principle of:** (Electromagnetic Induction)
12. **The shape of the wave for standard alternating current is:** (Sine wave)
13. **In a pure resistive AC circuit, the voltage and current are:** (In phase)
14. **The unit of AC frequency is:** (Hertz)
15. **A transformer that increases the output voltage is called a:** (Step-up transformer)

16. **The average value of AC over a complete cycle is:** (Zero)
17. **Which component opposes the flow of AC through its "reactance"?** (Inductor/Capacitor)
18. **The opposition to AC in a purely capacitive circuit is called:** (Capacitive Reactance)
19. **AC can be converted into DC using a device called a:** (Rectifier)
20. **A "Cycle" of AC consists of one positive and one _____ half-cycle.** (Negative)
21. **In Pakistan, the RMS voltage of domestic AC supply is:** (220 V)
22. **Transformers do not work with DC because DC cannot produce a _____ .** (Changing magnetic flux)
23. **The phase difference between voltage and current in a purely inductive circuit is:** (90 degrees / Voltage leads current)
24. **The "Power Factor" of an AC circuit is the cosine of the _____ .** (Phase angle)
25. **The SI unit of Impedance is:** (Ohm)
26. **What is the frequency of Direct Current (DC)?** (Zero)
27. **Capacitors allow _____ to pass but block _____ .** (AC, DC)
28. **The core of a transformer is laminated to reduce _____ losses.** (Eddy current)
29. **Which wire in an AC circuit is connected to the ground for safety?** (Earth wire)
30. **One full rotation of an AC generator armature corresponds to _____ cycle(s).** (One)

Physics: Electricity (Comprehensive Chapter)

1. **The rate of flow of electric charge through a conductor is called:**
    - A) Potential difference
    - B) Electric current
    - C) Resistance
    - D) Capacitance
2. **Which of the following is the SI unit of electric charge?**
    - A) Ampere
    - B) Volt
    - C) Coulomb
    - D) Ohm
3. **The instrument used to measure the potential difference across a component is:**
    - A) Ammeter
    - B) Galvanometer
    - C) Voltmeter
    - D) Ohmmeter
4. **According to Ohm's Law, if the resistance of a circuit is doubled while voltage remains constant, the current will be:**
    - A) Doubled
    - B) Quadrupled
    - C) Halved
    - D) Unchanged
5. **Materials that do not allow electric current to pass through them are called:**
    - A) Conductors
    - B) Semiconductors
    - C) Insulators

- D) Electrolytes

6. **The resistance of a conductor is inversely proportional to its:**
   - A) Length
   - B) Temperature
   - C) Cross-sectional area
   - D) Resistivity
7. **In a series circuit, if one bulb burns out, the other bulbs will:**
   - A) Stay lit
   - B) Get brighter
   - C) Turn off
   - D) Flicker
8. **The equivalent resistance of two 4-ohm resistors connected in parallel is:**
   - A) 8 ohms
   - B) 4 ohms
   - C) 2 ohms
   - D) 1 ohm
9. **Electric power is mathematically defined as:**
   - A) P=V/I
   - B) P=VI
   - C) P=I/V
   - D) P=V2I
10. **The unit of electrical energy commonly used in electricity bills is:**
    - A) Joule
    - B) Watt
    - C) Kilowatt-hour (kWh)
    - D) Ampere-hour
11. **Conventional current is assumed to flow from:** (Positive to Negative terminal)
12. **The flow of 1 Coulomb of charge per second is equal to:** (1 Ampere)
13. **Which law states that V=IR?** (Ohm's Law)
14. **An ideal ammeter should have _____ resistance.** (Zero)
15. **A fuse wire is always connected in _____ with the live wire.** (Series)
16. **The process of connecting the metallic body of an appliance to the earth is:** (Earthing)
17. **Which material is commonly used as a filament in electric bulbs?** (Tungsten)
18. **The heating effect of electric current is known as _____ heating.** (Joule)
19. **Resistivity of a material depends only on its _____ .** (Nature and Temperature)
20. **In a parallel circuit, the _____ remains constant across all branches.** (Voltage)
21. **The 'Live' wire in a domestic circuit is usually colored:** (Brown or Red)
22. **What happens to the resistance of a wire if its length is tripled?** (It triples)
23. **Electric potential is a _____ quantity.** (Scalar)
24. **A secondary cell is one that can be _____ .** (Recharged)
25. **The device used to protect circuits from overloading and short circuits is:** (Circuit Breaker/Fuse)
26. **What is the resistance of a human body (dry skin) approximately?** (100,000 ohms)
27. **Chemical effect of current is used in _____ .** (Electroplating)
28. **1 kWh is equal to _____ Joules.** (3.6×106 J)

29. **Copper is a good conductor because it has many _____ .** (Free electrons)
30. **The work done in moving a unit charge between two points is:** (Potential Difference)

Physics Chapter 17: Electromagnetic Radiation

1. **The entire range of all types of electromagnetic radiation is called the:**
    - A) Visible light
    - B) Electromagnetic spectrum
    - C) Wave range
    - D) Frequency scale
2. **In a vacuum, all electromagnetic waves travel at a speed similar to:**
    - A) Sound
    - B) Light
    - C) Electricity
    - D) Wind
3. **Which type of radiation has the highest frequency in the electromagnetic spectrum?**
    - A) Radio waves
    - B) Infrared
    - C) Gamma rays
    - D) Visible light
4. **The distance between two consecutive peaks or troughs of a wave is its:**
    - A) Frequency
    - B) Amplitude
    - C) Wavelength
    - D) Period
5. **Which radiation is used by doctors to take images of bones and teeth?**
    - A) Microwaves
    - B) X-rays
    - C) Ultraviolet
    - D) Radio waves
6. **The main source of ultraviolet (UV) radiation for Earth is:**
    - A) Light bulbs
    - B) The Sun
    - C) Stars
    - D) X-ray machines
7. **When an atom absorbs energy and its electrons move to a higher energy state, the atom is said to be:**
    - A) Ionized
    - B) Excited
    - C) Neutral
    - D) Radioactive
8. **Night vision goggles capture which type of radiation emitted by skin and warm objects?**
    - A) Visible light
    - B) Infrared
    - C) X-rays

    - D) Gamma rays
9. **Which type of waves are primarily used for TV and mobile communication?**
    - A) Gamma rays
    - B) Microwaves
    - C) Radio waves
    - D) Ultraviolet
10. **The process of removing an electron from an atom is called:**
    - A) Excitation
    - B) Polarization
    - C) Ionization
    - D) Reflection
11. **Electromagnetic waves consist of oscillating electric and _____ fields.** (Magnetic)
12. **The range of frequencies humans can see is called _____ light.** (Visible)
13. **Which waves have the longest wavelength in the spectrum?** (Radio waves)
14. **What is the SI unit of frequency?** (Hertz / Hz)
15. **The inverse square law describes how the intensity of radiation _____ as distance increases.** (Decreases)
16. **Gamma rays were discovered by _____ .** (Paul Villard)
17. **X-rays were discovered by _____ .** (Roentgen)
18. **A doctor uses _____ imaging to see inside the human body.** (Gamma-ray)
19. **The study of how electromagnetic waves interact with matter is called _____ .** (Spectroscopy)
20. **Visible light allows us to see objects and _____ .** (Colours)
21. **Microwaves are used for _____ at home or in the office.** (Cooking)
22. **UV radiation can cause skin _____ and burns.** (Tanning)
23. **Electromagnetic waves do not require a _____ to travel through.** (Medium / Vacuum)
24. **High-energy radiation like X-rays can _____ atoms.** (Ionize)
25. **Radio waves and microwaves were discovered by _____ .** (Hertz)
26. **In the spectrum, frequency increases as wavelength _____ .** (Decreases)
27. **Airport security uses _____ to check through bags.** (X-rays)
28. **An atom is in its _____ state when electrons are at their lowest energy level.** (Ground)
29. **Which waves are used by astronomers to study the structure of galaxies?** (Microwaves)
30. **Thermal radiation is another name for _____ radiation.** (Infrared)

Chemistry: Water (Properties, Hardness, and Purification)

1. **Water is often called the "Universal Solvent" because:**
    - A) It is found everywhere on Earth.
    - B) It can dissolve more substances than any other liquid.
    - C) It is a very cheap liquid.
    - D) It is essential for all living things.
2. **Pure water is a _____ conductor of electricity.**
    - A) Good
    - B) Poor

- C) Excellent
- D) Perfect

3. **The bond angle in a water molecule (H_2O) is approximately:**
   - A) 180°
   - B) 90°
   - C) 104.5°
   - D) 120°
4. **Water reaches its maximum density at a temperature of:**
   - A) 0°C
   - B) 100°C
   - C) 4°C
   - D) -4°C
5. **Soft water is water that:**
   - A) Contains many minerals.
   - B) Is difficult to drink.
   - C) Produces a rich lather with soap easily.
   - D) Is found only in the ocean.
6. **Hardness of water is primarily caused by the presence of dissolved salts of:**
   - A) Sodium and Potassium
   - B) Calcium and Magnesium
   - C) Iron and Copper
   - D) Gold and Silver
7. **Temporary hardness of water is caused by the presence of:**
   - A) Calcium and Magnesium Chlorides
   - B) Calcium and Magnesium Sulfates
   - C) Calcium and Magnesium Bicarbonates
   - D) Sodium Carbonate
8. **Temporary hardness can be removed by the simple process of:**
   - A) Filtration
   - B) Boiling
   - C) Distillation
   - D) Evaporation
9. **Permanent hardness of water is caused by the presence of:**
   - A) Carbonates
   - B) Bicarbonates
   - C) Chlorides and Sulfates of Ca and Mg
   - D) Sodium Chloride
10. **Which chemical is commonly used to remove permanent hardness (Washing Soda)?**
    - A) NaOH
    - B) Na_2CO_3
    - C) $NaHCO_3$
    - D) HCl
11. **The process of removing all dissolved salts from water is called:**
    (Deionization/Distillation)
12. **The heat required to convert 1g of water into steam is its Latent Heat of _____ .**
    (Vaporization)

13. **Water is a _____ molecule due to the difference in electronegativity between H and O.** (Polar)
14. **The chemical formula for "Heavy Water" is:** (D2O)
15. **Clark's Method for removing temporary hardness involves adding:** (Calcium Hydroxide / Lime water)
16. **Permanent hardness cannot be removed by _____ .** (Boiling)
17. **Zeolites are used in the _____ process for softening water.** (Ion-exchange)
18. **The scale formed inside boilers due to hard water is called:** (Boiler Scale)
19. **Water expands when it freezes into ice; this is called _____ expansion.** (Anomalous)
20. **Which gas is used to kill bacteria and disinfect water?** (Chlorine)
21. **The boiling point of pure water at sea level is:** (100°C)
22. **The pH of pure, neutral water at 25°C is exactly:** (7)
23. **"Scum" is the insoluble precipitate formed when hard water reacts with:** (Soap)
24. **Specific heat capacity of water is approximately _____ J/g°C.** (4.18)
25. **Is water an organic or inorganic compound?** (Inorganic)
26. **The process by which plants release water vapor into the air is:** (Transpiration)
27. **Hard water is generally _____ to use in steam engines.** (Harmful/Dangerous)
28. **Modern water purifiers often use _____ to remove microscopic impurities.** (Reverse Osmosis / RO)
29. **The force of attraction between water molecules is called _____ bonding.** (Hydrogen)
30. **Water that contains a high concentration of dissolved salts is _____ water.** (Hard/Saline)

Chemistry: Solutions (Concentrations, Solubility, and Colloids)

1. **A homogeneous mixture of two or more substances is called a:**
    - A) Suspension
    - B) Solution
    - C) Emulsion
    - D) Compound
2. **The component of a solution present in the largest amount is the:**
    - A) Solute
    - B) Precipitate
    - C) Solvent
    - D) Electrolyte
3. **A solution in which water is the solvent is known as an:**
    - A) Ether solution
    - B) Organic solution
    - C) Aqueous solution
    - D) Alcoholic solution
4. **A solution that can dissolve more solute at a given temperature is said to be:**
    - A) Saturated
    - B) Supersaturated
    - C) Unsaturated
    - D) Concentrated
5. **The number of moles of solute dissolved in one liter (1 dm3) of solution is called:**

- A) Molality
- B) Molarity
- C) Mole fraction
- D) Normality

6. **A solution containing a relatively small amount of dissolved solute is:**
   - A) Concentrated
   - B) Dilute
   - C) Standard
   - D) Saturated
7. **The maximum amount of solute that can dissolve in 100g of solvent at a specific temperature is its:**
   - A) Molarity
   - B) Density
   - C) Solubility
   - D) Viscosity
8. **"Like dissolves like" is a general rule that refers to the _____ of substances.**
   - A) Mass
   - B) Volume
   - C) Polarity
   - D) Temperature
9. **A mixture in which solute particles are so large that they settle out upon standing is a:**
   - A) True solution
   - B) Colloid
   - C) Suspension
   - D) Alloy
10. **The scattering of a beam of light by the particles in a colloid is called the:**
    - A) Doppler effect
    - B) Tyndall effect
    - C) Greenhouse effect
    - D) Photoelectric effect
11. **An example of a solid-in-solid solution (alloy) is:** (Brass / Bronze)
12. **Molarity is represented by the capital letter:** (M)
13. **A solution with a molarity of 1.0 is called a _____ solution.** (Molar)
14. **Which of the following does not settle down upon standing?** (True solution / Colloid)
15. **The solubility of gases in liquids generally _____ with an increase in temperature.** (Decreases)
16. **The solubility of most solids in liquids _____ with an increase in temperature.** (Increases)
17. **A mixture that appears homogeneous but is actually heterogeneous at the microscopic level is a:** (Colloid)
18. **The unit of Molarity is:** (moles per liter or mol/dm3)
19. **Blood and Milk are examples of:** (Colloids)
20. **In a solution of sugar in water, sugar is the _____ .** (Solute)
21. **Which mixture can be separated by simple filtration?** (Suspension)

22. **Percentage weight/weight (w/w) refers to the mass of solute in 100g of _____ .** (Solution)
23. **Non-polar solutes (like grease) are soluble in _____ solvents.** (Non-polar, like Benzene)
24. **A solution whose concentration is exactly known is a _____ solution.** (Standard)
25. **Is air a solution?** (Yes, a gas-in-gas solution)
26. **Particles in a true solution are _____ than 1 nanometer.** (Smaller)
27. **The process of surrounding solute particles with solvent molecules is:** (Solvation/Hydration)
28. **Does a true solution show the Tyndall effect?** (No)
29. **Tincture of iodine is a solution of iodine in _____ .** (Alcohol)
30. **When a saturated solution is cooled, the excess solute usually _____ .** (Crystallizes)

Chemistry: Solutions (Concentrations, Solubility, and Colloids)

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    - D) Compound
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    - D) Electrolyte
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    - B) Supersaturated
    - C) Unsaturated
    - D) Concentrated
5. **The number of moles of solute dissolved in one liter (1 dm3) of solution is called:**
    - A) Molality
    - B) Molarity
    - C) Mole fraction
    - D) Normality
6. **A solution containing a relatively small amount of dissolved solute is:**
    - A) Concentrated
    - B) Dilute
    - C) Standard
    - D) Saturated

Chemistry: pH Scale and Buffer Systems

1. **The term "pH" stands for "potential of Hydrogen" and measures the concentration of:**
    - A) Hydroxide ions (OH^-)
    - B) Hydrogen ions (H^+)
    - C) Oxygen atoms
    - D) Water molecules
2. **The pH scale ranges from:**
    - A) 1 to 10
    - B) 0 to 14
    - C) -7 to +7
    - D) 1 to 100
3. **A solution with a pH of 7 is classified as:**
    - A) Acidic
    - B) Basic
    - C) Neutral
    - D) Alkaline
4. **As the concentration of hydrogen ions (H^+) increases, the pH value:**
    - A) Increases
    - B) Decreases
    - C) Stays the same
    - D) Becomes 14
5. **A solution with a pH of 10 is:**
    - A) Weakly acidic
    - B) Strongly acidic
    - C) Basic (Alkaline)
    - D) Neutral
6. **A "Buffer Solution" is a solution that:**
    - A) Changes color when an acid is added.
    - B) Resists changes in pH when small amounts of acid or base are added.
    - C) Always has a pH of 7.
    - D) Neutralizes all chemicals instantly.
7. **Acidic buffers are generally made by mixing:**
    - A) A strong acid and its salt.
    - B) A weak acid and its salt with a strong base.
    - C) A strong base and water.
    - D) Two different strong acids.
8. **The main buffer system that maintains the pH of human blood is the:**
    - A) Protein buffer
    - B) Phosphate buffer
    - C) Carbonate/Bicarbonate buffer system
    - D) Sodium chloride buffer
9. **The normal pH range of human blood is approximately:**
    - A) 6.0 to 6.5
    - B) 7.35 to 7.45

- C) 8.0 to 9.0
- D) 2.0 to 3.0

10. **A basic (alkaline) buffer consists of:**
    - A) A weak base and its salt with a strong acid.
    - B) A strong base and a strong acid.
    - C) Pure water and salt.
    - D) Ammonia and water only.
11. **Mathematically, pH is defined as the negative logarithm of _____ concentration.** (Hydrogen ion)
12. **A change of 1 pH unit represents a _____ -fold change in acidity.** (Ten)
13. **Which organ in the human body helps regulate blood pH by excreting H+?** (Kidneys)
14. **Which indicator is often used to estimate pH across a wide range?** (Universal Indicator)
15. **If the pH of blood falls below 7.35, the condition is called _____ .** (Acidosis)
16. **If the pH of blood rises above 7.45, the condition is called _____ .** (Alkalosis)
17. **The sum of pH and pOH is always equal to _____ at 25°C.** (14)
18. **Buffers are essential in biological systems to maintain _____ .** (Homeostasis/Enzyme activity)
19. **An example of a weak acid used in acidic buffers is _____ acid.** (Acetic)
20. **An example of a weak base used in basic buffers is _____ .** (Ammonia/Ammonium Hydroxide)
21. **Does pure distilled water have any buffering capacity?** (No)
22. **The pH of a solution can be measured precisely using a _____ .** (pH meter)
23. **Gastric juice in the stomach has a very _____ pH.** (Low / approx 1.5 to 3.5)
24. **When a small amount of HCl is added to a buffer, the pH change is _____ .** (Negligible/Very small)
25. **The Bicarbonate buffer system involves CO2 and _____ .** ($HCO3^-$)
26. **Substances that can act as both an acid and a base are called _____ .** (Amphoteric)
27. **Amino acids can act as buffers because they have both _____ and _____ groups.** (Acidic/Carboxyl and Basic/Amino)
28. **High CO2 levels in the blood lead to a _____ in pH.** (Decrease)
29. **The pKa of an acid is the pH at which the acid is _____ % dissociated.** (50)
30. **Titration curves of buffers show a "flat" region called the _____ region.** (Buffering)

    -

7. **The maximum amount of solute that can dissolve in 100g of solvent at a specific temperature is its:**
    - A) Molarity
    - B) Density
    - C) Solubility
    - D) Viscosity
8. **"Like dissolves like" is a general rule that refers to the _____ of substances.**
    - A) Mass
    - B) Volume
    - C) Polarity

- D) Temperature

9. **A mixture in which solute particles are so large that they settle out upon standing is a:**
    - A) True solution
    - B) Colloid
    - C) Suspension
    - D) Alloy
10. **The scattering of a beam of light by the particles in a colloid is called the:**
    - A) Doppler effect
    - B) Tyndall effect
    - C) Greenhouse effect
    - D) Photoelectric effect
11. **An example of a solid-in-solid solution (alloy) is:** (Brass / Bronze)
12. **Molarity is represented by the capital letter:** (M)
13. **A solution with a molarity of 1.0 is called a _____ solution.** (Molar)
14. **Which of the following does not settle down upon standing?** (True solution / Colloid)
15. **The solubility of gases in liquids generally _____ with an increase in temperature.** (Decreases)
16. **The solubility of most solids in liquids _____ with an increase in temperature.** (Increases)
17. **A mixture that appears homogeneous but is actually heterogeneous at the microscopic level is a:** (Colloid)
18. **The unit of Molarity is:** (moles per liter or mol/dm3)
19. **Blood and Milk are examples of:** (Colloids)
20. **In a solution of sugar in water, sugar is the _____ .** (Solute)
21. **Which mixture can be separated by simple filtration?** (Suspension)
22. **Percentage weight/weight (w/w) refers to the mass of solute in 100g of _____ .** (Solution)
23. **Non-polar solutes (like grease) are soluble in _____ solvents.** (Non-polar, like Benzene)
24. **A solution whose concentration is exactly known is a _____ solution.** (Standard)
25. **Is air a solution?** (Yes, a gas-in-gas solution)
26. **Particles in a true solution are _____ than 1 nanometer.** (Smaller)
27. **The process of surrounding solute particles with solvent molecules is:** (Solvation/Hydration)
28. **Does a true solution show the Tyndall effect?** (No)
29. **Tincture of iodine is a solution of iodine in _____ .** (Alcohol)
30. **When a saturated solution is cooled, the excess solute usually _____ .** (Crystallizes)

Chemistry: Electrolytes and Electrolysis

1. **A substance that conducts electricity when dissolved in water or in a molten state is called a/an:**
    - A) Insulator
    - B) Electrolyte
    - C) Non-electrolyte

- D) Semiconductor

2. **The process of decomposition of an electrolyte by passing an electric current is known as:**
   - A) Ionization
   - B) Electrolysis
   - C) Hydrolysis
   - D) Thermolysis
3. **The electrode connected to the positive terminal of the battery is the:**
   - A) Cathode
   - B) Anion
   - C) Anode
   - D) Cation
4. **During electrolysis, the ions that move toward the cathode are called:**
   - A) Anions
   - B) Cations
   - C) Neutrons
   - D) Positrons
5. **Which of the following is an example of a strong electrolyte?**
   - A) Pure water
   - B) Sugar solution
   - C) Sodium Chloride ($NaCl$) solution
   - D) Acetic acid
6. **A substance that does not conduct electricity in any state is a:**
   - A) Strong electrolyte
   - B) Weak electrolyte
   - C) Non-electrolyte
   - D) Conductor
7. **In an electrolytic cell, reduction (gain of electrons) always takes place at the:**
   - A) Anode
   - B) Cathode
   - C) Electrolyte
   - D) Salt bridge
8. **The process of coating a cheaper metal with a superior metal using electricity is:**
   - A) Galvanization
   - B) Electroplating
   - C) Vulcanization
   - D) Alloying
9. **Which gas is produced at the anode during the electrolysis of water?**
   - A) Hydrogen
   - B) Nitrogen
   - C) Oxygen
   - D) Chlorine
10. **A weak electrolyte is one that:**
    - A) Does not dissolve in water.
    - B) Ionizes only slightly in solution.
    - C) Conducts electricity better than metals.

- D) Is always a solid.

11. **The electrode where oxidation (loss of electrons) occurs is the:** (Anode)
12. **Anions carry a _____ charge and move toward the _____.** (Negative, Anode)
13. **Cations carry a _____ charge and move toward the _____.** (Positive, Cathode)
14. **A liquid or solution that contains ions is called an _____ .** (Electrolytic bath/Electrolyte)
15. **The container in which electrolysis is carried out is called an _____ cell.** (Electrolytic)
16. **Is sugar solution an electrolyte?** (No, it is a non-electrolyte)
17. **Which metal is commonly used for electroplating to prevent rusting?** (Chromium/Zinc/Tin)
18. **The branch of chemistry dealing with electricity and chemical changes is:** (Electrochemistry)
19. **Molten $NaCl$ conducts electricity because its _____ are free to move.** (Ions)
20. **During the electrolysis of brine ($NaCl$ solution), _____ gas is released at the cathode.** (Hydrogen)
21. **In the extraction of Aluminum, the process used is _____ .** (Electrolysis/Hall-Héroult process)
22. **Strong electrolytes ionize _____ in water.** (Completely)
23. **The flow of electricity through an electrolyte is due to the movement of _____ .** (Ions)
24. **The flow of electricity through a copper wire is due to the movement of _____ .** (Electrons)
25. **An example of a weak electrolyte is _____ acid.** (Acetic/Citric)
26. **Electroplating is used for protection against _____ .** (Corrosion/Rusting)
27. **What is the charge of a cathode in an electrolytic cell?** (Negative)
28. **What is the charge of an anode in an electrolytic cell?** (Positive)
29. **Which device converts chemical energy into electrical energy?** (Voltaic/Galvanic cell)
30. **Voltaic cells involve _____ chemical reactions.** (Spontaneous)

Chemistry: Amines and Amides

1. **Amines are organic derivatives of which inorganic compound?**
   - A) Water
   - B) Ammonia (NH_3)
   - C) Methane
   - D) Carbon dioxide
2. **The functional group present in a primary amine is:**
   - A) $-OH$
   - B) $-NH_2$
   - C) $-COOH$
   - D) $-CHO$
3. **An amine in which two hydrogen atoms of ammonia are replaced by alkyl groups is a:**
   - A) Primary amine
   - B) Secondary amine
   - C) Tertiary amine

- D) Quaternary salt

4. **Amines generally have a characteristic odor similar to:**
   - A) Rotten eggs
   - B) Fruity perfume
   - C) Decaying fish
   - D) Fresh flowers
5. **The functional group of an amide is characterized by a carbonyl group ($C=O$) linked to a/an:**
   - A) Oxygen atom
   - B) Nitrogen atom
   - C) Hydroxyl group
   - D) Halogen
6. **Which of the following is the simplest aromatic amine?**
   - A) Methylamine
   - B) Ethylamine
   - C) Aniline
   - D) Acetamide
7. **Amines behave as weak _____ because they possess a lone pair of electrons on the nitrogen atom.**
   - A) Acids
   - B) Bases
   - C) Oxidizing agents
   - D) Catalysts
8. **The bond that links amino acids together in a protein is a/an _____ bond.**
   - A) Ionic
   - B) Peptide (Amide)
   - C) Glycosidic
   - D) Metallic
9. **Which of the following is a common diamide used as a nitrogenous fertilizer?**
   - A) Acetamide
   - B) Urea
   - C) Benzamide
   - D) Formamide
10. **The reaction of a carboxylic acid with an amine (under heat) typically produces:**
    - A) An ester
    - B) An alcohol
    - C) An amide
    - D) An ether
11. **Amines are classified as primary, secondary, or tertiary based on the number of _____ groups attached to nitrogen.** (Alkyl/Aromatic)
12. **What is the chemical formula for Methylamine?** (CH_3NH_2)
13. **Are low molecular weight amines soluble in water?** (Yes, due to hydrogen bonding)
14. **The suffix used in the IUPAC naming of amines is:** (-amine)
15. **The basicity of amines makes them react with acids to form _____ .** (Ammonium salts)
16. **Amides are generally _____ at room temperature, except for formamide.** (Solids)

17. **Hydrolysis of an amide in an acidic medium yields a carboxylic acid and an _____ .** (Ammonium salt)
18. **The chemical formula for Urea is:** (NH_2CONH_2)
19. **Quaternary ammonium salts are often used as _____ in hospitals.** (Disinfectants/Antiseptics)
20. **Many neurotransmitters in the human body, like adrenaline, are _____ .** (Amines)
21. **The boiling points of primary amines are _____ than alkanes of similar mass.** (Higher)
22. **Secondary amines have _____ hydrogen atom(s) attached to the nitrogen.** (One)
23. **Tertiary amines have _____ hydrogen atom(s) attached to the nitrogen.** (Zero)
24. **The "fishy" smell of breath in certain medical conditions is often due to _____ .** (Methylamines)
25. **Is aniline soluble in water?** (No, it is insoluble due to the large benzene ring)
26. **Which functional group is more neutral: Amine or Amide?** (Amide)
27. **Alkaloids, found in plants like poppies and coffee, are naturally occurring _____ .** (Amines)
28. **The nitrogen atom in amines has a _____ shape.** (Pyramidal)
29. **Nylon is a synthetic polymer that contains many _____ linkages.** (Amide)
30. **Amines turn _____ litmus paper _____ .** (Red, Blue)

Chemistry: Proteins

1. **Proteins are high molecular weight polymers made of:**
    - A) Fatty acids
    - B) Amino acids
    - C) Monosaccharides
    - D) Nucleotides
2. **The primary bond that links amino acids together in a protein chain is the:**
    - A) Glycosidic bond
    - B) Hydrogen bond
    - C) Peptide bond
    - D) Ester bond
3. **How many standard amino acids are commonly found in proteins?**
    - A) 10
    - B) 20
    - C) 50
    - D) 100
4. **The linear sequence of amino acids in a polypeptide chain refers to its:**
    - A) Primary structure
    - B) Secondary structure
    - C) Tertiary structure
    - D) Quaternary structure
5. **Which level of protein structure involves the folding into Alpha-helices and Beta-pleated sheets?**
    - A) Primary
    - B) Secondary

- C) Tertiary
- D) Quaternary

6. **Proteins that act as biological catalysts to speed up chemical reactions are:**
   - A) Hormones
   - B) Vitamins
   - C) Enzymes
   - D) Antibodies
7. **The specific protein that carries oxygen in the human blood is:**
   - A) Collagen
   - B) Insulin
   - C) Hemoglobin
   - D) Keratin
8. **Essential amino acids are those that:**
   - A) Are made by the body.
   - B) Must be obtained from the diet.
   - C) Are not required for health.
   - D) Contain only carbon and hydrogen.
9. **The structural protein found in hair, nails, and the outer layer of skin is:**
   - A) Albumin
   - B) Myosin
   - C) Keratin
   - D) Fibrinogen
10. **The process of destroying the natural shape of a protein (by heat or pH change) is called:**
    - A) Digestion
    - B) Denaturation
    - C) Hydrolysis
    - D) Polymerization
11. **The overall three-dimensional shape of a single polypeptide chain is the _____ structure.** (Tertiary)
12. **What is the simplest amino acid?** (Glycine)
13. **Amino acids contain both an _____ group and a _____ group.** (Amino, Carboxyl)
14. **Proteins are classified as _____ when they contain only amino acids.** (Simple proteins)
15. **Casein is a protein found in _____ .** (Milk)
16. **Which protein regulates glucose levels in the blood?** (Insulin)
17. **The "building blocks" of proteins are _____ .** (Amino acids)
18. **A protein consisting of more than one polypeptide chain has a _____ structure.** (Quaternary)
19. **Complete proteins (containing all essential amino acids) are usually derived from _____ sources.** (Animal)
20. **The test used to detect the presence of proteins in a sample is the _____ test.** (Biuret test)
21. **Which element is always present in proteins but not usually in carbohydrates?** (Nitrogen)
22. **Collagen is a _____ protein that provides strength to connective tissues.** (Fibrous)

23. **Enzymes usually end with the suffix _____ .** (-ase)
24. **The deficiency of protein in children can lead to a condition called _____ .** (Kwashiorkor / Marasmus)
25. **Is hemoglobin a globular or fibrous protein?** (Globular)
26. **The pH at which an amino acid has no net charge is the _____ point.** (Isoelectric)
27. **Antibodies are proteins that help the body fight _____ .** (Infections/Pathogens)
28. **Myosin and Actin are proteins involved in _____ .** (Muscle contraction)
29. **Hydrolysis of proteins yields _____ .** (Free amino acids)
30. **Are enzymes highly specific in their action?** (Yes)

Chemistry: Carbohydrates

1. **Carbohydrates are chemically defined as polyhydroxy aldehydes or polyhydroxy:**
    - A) Alcohols
    - B) Ketones
    - C) Ethers
    - D) Amines
2. **The general formula for most carbohydrates is:**
    - A) Cn(H2O)n
    - B) CnH2nO
    - C) C12H22O11
    - D) CH3COOH
3. **Which of the following is a "Monosaccharide" (simple sugar)?**
    - A) Sucrose
    - B) Starch
    - C) Glucose
    - D) Cellulose
4. **The sugar found in fruits and honey, which is also the sweetest natural sugar, is:**
    - A) Glucose
    - B) Galactose
    - C) Fructose
    - D) Maltose
5. **A carbohydrate that yields two monosaccharide units upon hydrolysis is a:**
    - A) Monosaccharide
    - B) Disaccharide
    - C) Polysaccharide
    - D) Oligosaccharide
6. **Cane sugar (table sugar) is chemically known as:**
    - A) Lactose
    - B) Maltose
    - C) Sucrose
    - D) Fructose
7. **The sugar found in milk is:**
    - A) Sucrose
    - B) Lactose
    - C) Glucose

- D) Glycogen

8. **Which polysaccharide serves as the primary energy storage in plants?**
   - A) Cellulose
   - B) Glycogen
   - C) Starch
   - D) Chitin
9. **The "animal starch" stored in the human liver and muscles is:**
   - A) Starch
   - B) Glycogen
   - C) Insulin
   - D) Cellulose
10. **The structural component of plant cell walls that humans cannot digest is:**
    - A) Glycogen
    - B) Amylose
    - C) Cellulose
    - D) Sucrose
11. **Glucose is an example of an _____ sugar (containing an aldehyde group).** (Aldose)
12. **Fructose is an example of a _____ sugar (containing a ketone group).** (Ketose)
13. **Sucrose is composed of one molecule of Glucose and one molecule of _____ .** (Fructose)
14. **Lactose is composed of Glucose and _____ .** (Galactose)
15. **The test commonly used to detect reducing sugars like glucose is _____ .** (Benedict's test or Fehling's test)
16. **Iodine test is used to detect the presence of _____ .** (Starch)
17. **What color does starch turn when iodine solution is added?** (Blue-Black)
18. **Are polysaccharides generally soluble or insoluble in water?** (Insoluble)
19. **The bond that links two monosaccharide units together is a _____ bond.** (Glycosidic)
20. **Is Sucrose a reducing or non-reducing sugar?** (Non-reducing)
21. **Maltose is also known as _____ sugar.** (Malt)
22. **Carbohydrates provide approximately _____ kcal of energy per gram.** (4)
23. **The simplest monosaccharides contain _____ carbon atoms.** (Three / Trioses)
24. **Excess glucose in the blood is converted into _____ for storage.** (Glycogen)
25. **Hydrolysis of starch eventually yields many molecules of _____ .** (Glucose)
26. **Which organ is primarily responsible for maintaining blood glucose levels?** (Liver)
27. **Dextrose is another name for _____ .** (Glucose)
28. **Cotton is almost pure _____ .** (Cellulose)
29. **Monosaccharides and Disaccharides are collectively called _____ because they are sweet.** (Sugars)
30. **The process by which plants produce carbohydrates using sunlight is _____ .** (Photosynthesis)