Physics Sample Questions:

1. Question: A body is moving in a circular path with constant speed. Which of the following remains constant?
    - (a) Velocity (b) Acceleration (c) Kinetic energy (d) Displacement
2. Question: The SI unit of surface tension is:
    - (a) N/m (b) N/m² (c) J/m (d) J/m²
3. Question: What is the function of a photodiode?
4. Question: In simple harmonic motion, at what displacement from the mean position is the kinetic energy equal to the potential energy?
5. Question: Define the law of equipartition of energy.
6. Question: What is the relationship between the angle of incidence and the angle of refraction in total internal reflection?
7. Question: State the principle of superposition of waves.
8. Question: A transformer works on the principle of:
    - (a) Self-induction (b) Mutual induction (c) Eddy currents (d) Hysteresis
9. Question: What are the dimensions of Planck's constant?
10. Question: What is the value of acceleration due to gravity at the centre of the earth?
11. Question: what is the difference between the isothermal and adiabatic processes?
12. Question: define magnetic flux.
13. Question: What are semiconductors?
14. Question: What is the function of a rectifier?
15. Question: What are the properties of electromagnetic waves?

Chemistry Sample Questions:

1. Question: What is the IUPAC name of CH_3CHO?
2. Question: Which element has the highest ionization enthalpy?
3. Question: What is the role of a catalyst in a chemical reaction?
4. Question: Explain the concept of colligative properties.
5. Question: What is the difference between crystalline and amorphous solids?
6. Question: Define the term "enthalpy of formation."
7. Question: What are the products of the reaction between an acid and a base?
8. Question: What is the structure and uses of benzene?
9. Question: Explain the concept of coordination compounds.
10. Question: What are polymers? Give examples.
11. Question: What is the concept of chemical kinetics?
12. Question: What are the properties of the elements from the p-block?
13. Question: what is the meaning of electrochemistry?
14. Question: what is the function of the reagent of tollens reagent?
15. Question: define the term isomer.

Mathematics Sample Questions:

1. Question: Find the derivative of sin(2x).
2. Question: Evaluate the integral of x^2 dx.
3. Question: What is the determinant of the matrix [[1, 2], [3, 4]]?
4. Question: Find the equation of a line passing through (2, 3) and (4, 5).
5. Question: What is the value of sin(π/6)?
6. Question: Define the term "continuity" in calculus.
7. Question: What are the properties of a circle?
8. Question: Explain the concept of vectors.
9. Question: What is the probability of getting a head when tossing a fair coin?
10. Question: Solve the quadratic equation $x^2 - 5x + 6 = 0$.
11. Question: What is the formula for the area of a triangle?
12. Question: what is the formula for the volume of a sphere?
13. Question: what are the properties of matrices?
14. Question: what is the definition of a limit in calculus?
15. Question: what is the definition of a differential equation?

Biology Sample Questions:

1. Question: What is the function of mitochondria?
2. Question: Explain the process of photosynthesis.
3. Question: What are the different types of tissues in plants?
4. Question: Describe the human digestive system.
5. Question: What is the role of DNA in heredity?
6. Question: Explain the concept of evolution.
7. Question: What are the different types of ecosystems?
8. Question: What is the importance of biodiversity?
9. Question: Describe the process of cellular respiration.
10. Question: What are the different types of blood groups?
11. Question: What is the function of the kidneys?
12. Question: Explain the process of mitosis and meiosis.
13. Question: what is the importance of vitamins?
14. Question: what is the human nervous system?
15. Question: explain the process of transpiration in plants.

Physics Answers and Solutions:

1. Answer: (c) Kinetic energy.
    - Solution: In uniform circular motion, speed is constant, hence kinetic energy (1/2 mv^2) is constant. Velocity and acceleration change direction and displacement varies.
2. Answer: (a) N/m.

    - Solution: Surface tension is force per unit length.
3. Answer: Detection of light.
4. Answer: Amplitude/√2.
5. Answer: Energy is equally distributed among all degrees of freedom.
6. Answer: The angle of incidence is greater than the critical angle.
7. Answer: The resultant displacement is the vector sum of individual wave displacements.
8. Answer: (b) Mutual induction.
9. Answer: $[ML^2T^{-1}]$.
10. Answer: Zero.
11. Answer: Isothermal=constant temperature. Adiabatic heat exchange.
12. Answer: The number of magnetic field lines passing through a given area.
13. Answer: Materials with conductivity between conductors and insulators.
14. Answer: To convert AC to DC.
15. Answer: They travel at the speed of light, they are transverse waves, etc.

Chemistry Answers and Solutions:

1. Answer: Ethanal.
2. Answer: Helium (He).
3. Answer: It alters the rate of reaction.
4. Answer: Properties that depend on the number of solute particles.
5. Answer: Crystalline has an ordered structure, and amorphous has a disordered.
6. Answer: The enthalpy changes when one mole of a compound is formed.
7. Answer: Salt and water.
8. Answer: Ring structure, used in many industrial processes.
9. Answer: Metal ions bonded to ligands.
10. Answer: Large molecules are made of repeating subunits. Examples: polyethylene, and nylon.
11. Answer: The study of reaction rates.
12. Answer: Varying properties, from metals to non-metals.
13. Answer: The study of chemical processes that cause electrons to move.
14. Answer: It is a mild oxidizing agent, used for aldehyde detection.
15. Answer: Molecules that have the same molecular formula but different structural formulas.

Mathematics Answers and Solutions:

1. Answer: $2\cos(2x)$.
2. Answer: $(x^3/3) + C$.
3. Answer: -2.
4. Answer: $y = x + 1$.
5. Answer: 1/2.
6. Answer: A function is continuous if its graph has no breaks.
7. Answer: Radius, diameter, circumference, area.
8. Answer: Quantities with magnitude and direction.

9. Answer: 1/2.
10. Answer: x = 2, 3.
11. Answer: 1/2 × base × height.
12. Answer: 4/3 × π × r^3.
13. Answer: Addition, subtraction, multiplication, determinants.
14. Answer: The value that a function approaches as the input approaches some value.
15. Answer: An equation involving a function and its derivatives.

Biology Answers and Solutions:

1. Answer: Cellular respiration, ATP production.
2. Answer: Conversion of light energy to chemical energy.
3. Answer: Meristematic, vascular, ground tissues.
4. Answer: Mouth, oesophagus, stomach, intestines, etc.
5. Answer: Carries genetic information.
6. Answer: Change in heritable characteristics over generations.
7. Answer: Forests, grasslands, aquatic ecosystems, etc.
8. Answer: Maintains ecological balance.
9. Answer: Breakdown of glucose to produce ATP.
10. Answer: A, B, AB, O.
11. Answer: Filtration of blood, removal of waste.
12. Answer: Mitosis: cell division for growth. Meiosis: cell division for gamete formation.
13. Answer: Essential for various bodily functions.
14. Answer: Central nervous system (brain and spinal cord) and peripheral nervous system.
15. Answer: The process of water movement through a plant and its evaporation from aerial parts.