

Physics:

Question: What is the principle of an alternating current (AC) generator?

Answer: The principle of an AC generator is electromagnetic induction, where a changing magnetic flux through a coil induces an electromotive force (EMF) and hence an alternating current.

Question: Define the term 'electric flux'.

Answer: Electric flux is a measure of the electric field passing through a given area, calculated as the product of the electric field strength and the area perpendicular to the field.

Question: What is the photoelectric effect?

Answer: The photoelectric effect is the emission of electrons from a metal surface when light of sufficient frequency falls on it.

Question: State Ohm's law.

Answer: Ohm's law states that the current through a conductor between two points is directly proportional to the voltage across the two points, provided the temperature and other physical conditions remain constant.

Question: What is the Bohr's model of the hydrogen atom?

Answer: The Bohr model of the hydrogen atom proposes that electrons orbit the nucleus in specific allowed orbits without radiating energy, and electrons can only gain or lose energy by jumping from one allowed orbit to another.

Chemistry:

Question: What is Le Chatelier's principle?

Answer: Le Chatelier's principle states that if a dynamic equilibrium is disturbed by changing the conditions, the position of equilibrium moves to counteract the change.

Question: Define the term 'enthalpy'.

Answer: Enthalpy is a measure of the total energy of a thermodynamic system. It includes the internal energy, which is the energy required to create a system, and the amount of energy required to make room for it by displacing its environment and establishing its volume and pressure.

Question: What is a Galvanic cell?

Answer: A Galvanic cell, also known as a voltaic cell, is an electrochemical cell that converts chemical energy into electrical energy. It achieves this through a spontaneous redox reaction.

Question: What is the Raoult's law?

Answer: Raoult's law states that the vapor pressure of a solution is directly proportional to the mole fraction of the solvent present in the solution.

Question: Define the term 'rate of reaction'.

Answer: The rate of reaction is the change in the concentration of a reactant or product per unit time.

Biology:

Question: What is the central dogma of molecular biology?

Answer: The central dogma of molecular biology states that genetic information flows from DNA to RNA to protein.

Question: Define the term 'genome'.

Answer: The genome is the complete set of genetic information in an organism, typically encoded in DNA or RNA.

Question: What is the difference between autotrophs and heterotrophs?

Answer: Autotrophs are organisms that can produce their own food using light or chemical energy, while heterotrophs are organisms that cannot produce their own food and must consume other organisms for energy.

Question: What is the role of ATP in cellular processes?

Answer: ATP (adenosine triphosphate) is the primary energy currency of the cell, providing the necessary energy for various cellular processes like muscle contraction, nerve impulse propagation, and chemical synthesis.

Question: Define the term 'ecosystem'.

Answer: An ecosystem is a community of living organisms (plants, animals, and microbes) in conjunction with the nonliving components of their environment (things like air, water, and mineral soil), interacting as a system.

Physics (continued):

Question: What is the law of conservation of momentum?

Answer: The law of conservation of momentum states that the total momentum of a closed system is conserved if no external forces act on it.

Question: Define the term 'refraction'.

Answer: Refraction is the change in direction of a wave passing from one medium to another, due to its change in speed.

Question: What is the Doppler effect?

Answer: The Doppler effect is the change in frequency or wavelength of a wave in relation to an observer who is moving relative to the wave source.

Question: What is the difference between real and virtual images?

Answer: Real images are formed when light rays converge and can be projected on a screen, while virtual images are formed when light rays appear to diverge from a point and cannot be projected.

Chemistry (continued):

Question: What is the IUPAC nomenclature?

Answer: The IUPAC nomenclature is a systematic way of naming chemical compounds as recommended by the International Union of Pure and Applied Chemistry.

Question: Define the term 'isotope'.

Answer: Isotopes are variants of a particular chemical element which differ in neutron number, and consequently in nucleon number.

Question: What is the octet rule?

Answer: The octet rule is a chemical rule of thumb that reflects the observation that elements tend to bond in such a way that each atom has eight electrons in its valence shell, giving it the same electronic configuration as a noble gas.

Biology (continued):

Question: What is the process of photosynthesis?

Answer: Photosynthesis is the process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water.

Question: Define the term 'genetic code'.

Answer: The genetic code is the set of rules by which information encoded in genetic material (DNA or mRNA sequences) is translated into proteins by living cells.