

# Compulsory Concepts (Second Year of Cycle Two)

The Living World	The Material World	The Earth And Space	The Technological World
<p><b>ECOLOGY</b></p> <ul style="list-style-type: none"> <li>- Study of populations (density, biological cycles)</li> <li>- Dynamics of communities                             <ul style="list-style-type: none"> <li>• Biodiversity</li> <li>• Disturbances</li> </ul> </li> <li>- Dynamics of ecosystems                             <ul style="list-style-type: none"> <li>• Trophic relationships</li> <li>• Primary productivity</li> <li>• Material and energy flow</li> <li>• Chemical recycling</li> </ul> </li> </ul>	<p><b>PHYSICAL PROPERTIES OF SOLUTIONS</b></p> <ul style="list-style-type: none"> <li>- Concentration (ppm)</li> <li>- Electrolytes</li> <li>- pH scale</li> <li>- Electrolytic dissociation</li> <li>- Ions</li> <li>- Electrical conductivity</li> </ul> <p><b>CHEMICAL CHANGES</b></p> <ul style="list-style-type: none"> <li>- Combustion</li> <li>- Photosynthesis and respiration</li> <li>- Acid-base neutralization reaction</li> <li>- Balancing chemical equations</li> <li>- Law of conservation of mass</li> </ul> <p><b>ORGANIZATION OF MATTER</b></p> <ul style="list-style-type: none"> <li>- Rutherford-Bohr atomic model</li> <li>- Lewis notation</li> </ul> <p><b>ELECTRICITY AND ELECTROMAGNETISM</b></p> <p><i>Electricity</i></p> <ul style="list-style-type: none"> <li>- Electrical charge</li> <li>- Static electricity</li> <li>- Ohm's law</li> <li>- Electrical circuits</li> <li>- Relationship between power and electrical energy</li> </ul> <p><i>Electromagnetism</i></p> <ul style="list-style-type: none"> <li>- Forces of attraction and repulsion</li> <li>- Magnetic field of a live wire</li> </ul> <p><b>TRANSFORMATION OF ENERGY</b></p> <ul style="list-style-type: none"> <li>- Law of conservation of energy</li> <li>- Energy efficiency</li> <li>- Distinction between heat and temperature</li> </ul>	<p><b>BIOGEOCHEMICAL CYCLES</b></p> <ul style="list-style-type: none"> <li>- Carbon cycle</li> <li>- Nitrogen cycle</li> </ul> <p><b>CLIMATE ZONES</b></p> <ul style="list-style-type: none"> <li>- Factors that influence the distribution of biomes</li> <li>- Marine biomes</li> <li>- Terrestrial biomes</li> </ul> <p><b>LITHOSPHERE</b></p> <ul style="list-style-type: none"> <li>- Minerals</li> <li>- Soil profile (horizons)</li> <li>- Permafrost</li> <li>- Energy resources</li> </ul> <p><b>HYDROSPHERE</b></p> <ul style="list-style-type: none"> <li>- Catchment area</li> <li>- Oceanic circulation</li> <li>- Glacier and ice floe</li> <li>- Salinity</li> <li>- Energy resources</li> </ul> <p><b>ATMOSPHERE</b></p> <ul style="list-style-type: none"> <li>- Green house effect</li> <li>- Atmospheric circulation</li> <li>- Air mass</li> <li>- Cyclone and anticyclone</li> <li>- Energy resources</li> </ul> <p><b>SPACE</b></p> <ul style="list-style-type: none"> <li>- Solar energy flow</li> <li>- Earth-Moon system (gravitational effect)</li> </ul>	<p><b>MECHANICAL ENGINEERING</b></p> <ul style="list-style-type: none"> <li>- Characteristics of linking mechanical parts</li> <li>- Guiding controls</li> <li>- Construction and characteristics of motion transmission systems (friction gears, pulleys and belt, gear assembly, sprocket wheels and chain, worm and worm gear)</li> <li>- Speed changes</li> <li>- Construction and characteristics of motion transformation systems (screw gear system, cams, connecting rods, cranks, slides, rotating slider crank mechanisms, rack-and-pinion drive)</li> </ul> <p><b>ELECTRICAL ENGINEERING</b></p> <ul style="list-style-type: none"> <li>- Power supply</li> <li>- Conduction, insulation, and protection</li> <li>- Control</li> <li>- Transformation of energy (electricity and light, heat, vibration, magnetism)</li> </ul> <p><b>MATERIALS</b></p> <ul style="list-style-type: none"> <li>- Constraints (deflection, shearing)</li> <li>- Characteristics of mechanical properties</li> <li>- Types and properties                             <ul style="list-style-type: none"> <li>• Plastics (thermoplastics, thermosetting plastics)</li> <li>• Ceramics</li> <li>• Composites</li> </ul> </li> <li>- Modification of properties (degradation, protection)</li> </ul>