

SYL M02 B1.3 rev. 1.0

Lesson
Subject
<p>2.1 Matter Nature of matter: the chemical elements, structure of atoms, molecules; Chemical compounds; States: solid, liquid and gaseous; Changes between states.</p>
<p>2.2.1 Statics Forces, moments and couples, representation as vectors; Centre of gravity; Elements of theory of stress, strain and elasticity: tension, compression, shear and torsion; Nature and properties of solid, fluid and gas; Pressure and buoyancy in liquids (barometers).</p>
<p>2.2.2 Kinetics Linear movement: uniform motion in a straight line, motion under constant acceleration (motion under gravity); Rotational movement: uniform circular motion (centrifugal/centripetal forces); Periodic motion: pendular movement; Simple theory of vibration, harmonics and resonance; Velocity ratio, mechanical advantage and efficiency</p>
<p>2.2.3 A Dynamics A Mass; Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency;</p>
<p>2.2.3 B Dynamics B Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).</p>
<p>2.2.4 A Fluid dynamics A Specific gravity and density;</p>
<p>2.2.4 B Fluid dynamics B Viscosity, fluid resistance, effects of streamlining; Effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi.</p>
<p>2.3 A Thermodynamics A Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin; Heat definition;</p>
<p>2.3 B Thermodynamics B Heat capacity, specific heat; Heat transfer: convection, radiation and conduction; Volumetric expansion; First and second law of thermodynamics; Gases: ideal gases laws; specific heat at constant volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps; Latent heats of fusion and evaporation, thermal energy, heat of combustion.</p>

Lesson
Subject
2.4 Optics Nature of light; speed of light; Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fibre optics.
2.5 Wave Motion and Sound Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.