Annexure - 4 - Summary of selected 5 SRTP videos

Video 1 – Seismometer

The video gives an introcution to the history and evolution of Seismic instruments used to detect/measure earthquake magnitude/intensity, starting from the oldest ancient chinese seismometers, to the gradually development of analogue seismometers based on the principle of intertia. Today, digital seismometers are extensively used for measurement of earthquake magnitude. The principle of these seismometers is Electromagnetism. In them a heavy mass wrapped with a metallic foil is place in a strong magnetic field which generates an EM wave on ground motion which is amplified and digitised by a digitizer. It also has a GPS Port which is used to get the exact location and time of the earthquake event. The video also gives a brief overview of how to use a digital seismometer.

Video 2 – Strong Motion Accelerograph

The video gives a brief overview of the working of a Strong Motion Acceleograph or SMA which is used to record acceleration of the ground during times of strongs of earthquakes. The SMA has a power cable connected to a 12V battery. It has an internet port which helps in configuring the device using a computer. There is a GPS port which gives information of the location and time of the event (earthquake). It is placed oriented towards north and completely balanced on a flat surface. Whenver a high magnitude earthquake occurs, the SMA measures the acceleration and transfers the data to an external memory card. The SMA has small MEMS (Microelectromechanical systems) chips present which are the sensors for measurement of acceleration

Video 3 - Nuclear Magnetic Resonance Spectrometer

The video gives an overview of the contruction and working principle of the NMR Spectrometer. The source of energy in NMR is radio waves. It works on the principle of Magnetic Resonance. If the external energy source of radio waves has the same energy as the difference in the energy of stable and excited magnetic energy states, then. Absorbing such RF radiation causes nucleas to spin flip and relaxing back to original sate causes Nuclear Magnetic Resonance. The video then gives a step by step approach of sample preparation, loading, information and insertion to study the final NMR spectra for the biological sample.

Video 4 - Demonstration of Fluorescence Spectrometer

The vido goes over the brief introduction of the phenomenon of Fluorescence, which is essentially emmission of light by a substance after absorption. The Fluorescence spectrometer is used to obtain the emission and absorption spectrum of the sample. The video then demonstrates sample loading for a pre-prepared sample for a given source of light. For the sample of carbon dots, the Fluorescence spectrum was obtained which was a Gaussian.

Video 5 - Thermo gravimetric Analysis

Thermal Analysis is a technique to study the properties of materials as they change with temperature. Thermo Gravimetric Anaysis or TGA is a specific type of Thermal Analysis in which sample is heated in a given environment and the change in the weight of the subtrate is recorded as a function of temperature (which increases at a constant rate). The plot of weight vs temperature is called a Thermogram. TGA tells us about the Thermal and oxidative stability of a material, estimated lifetime of a substance as well as the moisture content of a material. The video also gives a demonstration of the working of a TGA to obtain the Thermogram of Calcium Oxalate which decomposes into calcium carbonate and subsequently into calcium oxide.