This thesis presents my work concerning, design considerations of a laser based air quality monitoring system having a microprocessor based data recording and processing unit, and investigations carried out with the system. Although air quality monitoring has been done for quite some time, the work in this thesis involves the attempt to synthesize the design principles of existing systems used in air quality monitoring, namely, the nephelometer, the transmissiometer, the point visibility meter and the lidar, so as to come up with the design considerations of a new system to monitor air quality with a laser source, which is far more economic, portable and fast but at the same time efficient and reliable.

An introduction to air quality monitoring, monitoring instruments and water vapour monitoring is given in Chapter I.

Chapter II reviews the theories of extinction and scattering, discusses Mie scattering in detail, and goes on to describe the software for computation of scattering coefficients.

The design and fabrication details of every unit of the air quality monitoring system and data processing details are presented in Chapter III.

Investigations by the air quality monitoring system on water vapour in air having different concentrations of O₂ and CO₂ are given in Chapter IV.

Conclusions drawn from the work and suggestions for future improvements are given in Chapter V.

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