Urban air pollution is one of the primary priorities of environmental concern due to public awareness. Necessity to inform the public of air pollution level is a very urgent problem nowadays. The emissions resulting from natural and anthropogenic sources such as industry, small energy consumers, road and air traffic, are very often of high uncertainty. Moreover, the monitoring of the criteria pollutants involves heavy financial, technical contributions, huge manpower and tedious analytical procedures with sophisticated equipment which could not be affordable nationwide, in developing countries like India.

On the other hand, the air environment has to be protected from polluting elements for the healthy survival of the future generations. A better alternative could be setting up of continuous monitoring stations at selected locations for a defined period and evolving models based on the observed data that will be useful for the implementation of mitigation strategies for controlling urban air pollution.

The aim of this research work is focused on the urban air quality monitoring and modelling for Coimbatore city, as a case study. Because this city is experiencing an exponential industrial and population growth, it has a high potential for air pollution. In addition, the prevailing meteorological conditions in this city are not favourable for the dispersion of pollutants. For the monitoring of the urban air quality, five air quality survey stations namely Peelamedu, Ganapathy, Gandhipuram, Gandhi Park and Ukkadam were selected based on a questionnaire survey conducted on the Coimbatore based population.

The data of the emission inventory in the urban environment is highly varying in nature and the dispersion is not influenced by this factor. Hence, the objective of this work is the monitoring of major air pollutants concentration in the urban atmosphere viz., Suspended Particulate Matter, Oxides of Nitrogen
and Sulphur dioxide influenced by the dispersion due to meteorological parameters namely surface temperature, pressure, wind velocity, wind direction and humidity.

The monitoring has been done for a period of 8 hours a day and once in a week at each station from January 2000 to December 2000. In order to generate time series data, a uniform time interval of seven days has been maintained between two successive monitoring at a station. Missing data due to technical reasons and unfavourable weather condition has been replaced with linear trends interpolation.

The descriptive statistics of the pollution and meteorological parameters illustrates the statistical characteristics of the urban environment with respect to the observed data. The spatial and temporal distributions of the air quality data have been analysed. The air quality index is a numerical value obtained from a mathematical relationship between pollution parameters and their ambient air quality standards. With the observed data, the air quality index for all the survey stations is determined for each monitoring day and the variations in the AQI are discussed.

Rose diagrams have been constructed for all the four seasons using the monitored data on prevailing wind direction and pollution parameters at each station. Wind rose diagrams are the pictorial representation of interrelationship between prevailing wind direction and wind speed whereas the pollution rose diagrams portray the pictorial representations of relationship between prevailing wind directions and pollution parameters. The frequency tables for the rose diagrams have been generated using the programs, developed in C programming language.

The air quality modelling is done using artificial neural network approach as it is found to be capable of handling the non-linear data with highly complex...
behaviour. Prediction models have been evolved for each of the survey stations to predict the pollutants concentration based on the meteorological parameters. Time series neural network approach has been applied to forecast the pollutants concentration one week in advance based on the meteorological variables, pollutants concentration on the monitoring day and on the pollutants concentration a week before.

This study revealed that the Suspended Particulate Matter concentration is quite often more than the prescribed air quality standards in all the places. Though the concentrations of NO\textsubscript{x} and SO\textsubscript{2} are within the limits, they frequently approach the standards in all the places. Among the survey stations chosen, the air atmosphere in Ganapathy and Gandhi Park have been less polluted and that in Peelamedu, Gandhipuram and Ukkadam have been more polluted.

There was no specific trend observed with the measured values and the fluctuations along the sequence of observations were due to random causes. However, no specific conclusion can be made with this random pattern because the observations were taken for one year only. The patterns of cycles and trends may appear with the longer period of data observation.

It is concluded that a proper air quality management is very much essential in this city. The forecasting models can be applied at the more polluted areas by setting up the permanent continuous air quality and weather monitoring stations and in other places the prediction models can be applied by setting up the meteorological stations alone. This modelling approach is suitable for any place and can be developed with moderate efforts and the performance of this approach is highly efficient.

The AQI can be determined from the predicted concentration of the pollutants and the public may be informed of the urban air environment with this air quality index. The developed C program for generation of frequency tables for
the construction of rose diagrams are general-purpose programs and can be used for any place.

The rose diagrams can be updated with the observations at the monitoring stations and can be used by the local control agencies to implement the control measures. The local control agencies in the developing cities will be much benefited by such monitoring and modelling procedures as they provide essential information for decision making in the implementation of environmental management plan.

The future study can be extended to the automatic generation of rose diagrams by linking the output of C program and Auto CAD through LISP. Based on the development activities, more number of stations can be included as UAQMSs to assess the urban air environment in the city. The effect of large data monitored over a long period on model building can be determined as the suggested modelling technique used only a limited database measured over a period of one year.

The models can be evolved using fuzzy logic techniques and compared with the suggested models. The air quality management programme can be made full-fledged by the inclusion of emission inventory modelling. The efficiency of the suggested models could be enhanced with the application of current optimization techniques such as factor analysis, Principal Component Analysis and Genetic Algorithm for optimal selection of surrogate parameters as predictor variables.