PREFACE
1/f noise plays an important role in choosing frequency band in which a device can be effectively used. As 1/f noise comes from the fluctuations of microscopic entities, it can act as a probe of what is happening physically at the microscopic scale. Characterization of noise with a 1/f like spectrum, and referred to as an excess or flicker noise, provided most important problems in modern radio physics. This noise limits the sensitivity and stability of many radio electronic devices, the requirements to which are enhancing constantly.

These fluctuations reflect many processes at the electron and atom levels and specific features of solid state micro-structure which makes 1/f noise a valuable informative parameter for evaluating the quality of materials and reliability of devices containing semiconductors and integrated micro chips. It is also used to predict the electro migration immunity of thin film metallization in integrated micro chips.

Recently, there has been sharply increasing interest in 1/f noise in thin metal films and other physical systems, which can be accounted for their wide application in different areas of physics and technology, especially in modern micro-electronics which makes high demands of thin films of different materials in manufacturing commutation layers, resistors, and contacts for integrated microcircuits.

1/f noise has been observed as fluctuations in an average seasonal temperature, annual amount of rainfall, rate of traffic flow, potential across nerve or synthetic membranes, rate of insulin uptake in diabetics, GNP of economics, loudness or pitch of music, earthquake cycles, sunspot cycles, and thunderstorms, height of the floods of the Nile or Ganges so on and so forth.
The existing method of 1/f noise measurement is a cumbersome in choosing suitable biasing network, amplifier, sound card and analyzing unit, each item individually. Because of which a lot of care has to be taken to match the impedances of individual units and the throughput accuracy will be at stake. So an attempt is made to integrate all the above parts in a compact system, which is versatile, sensitive enough at low frequencies resulting in an improved experimental technique. The technique is demonstrated in use to determine the dependence of the 1/f noise of CdO and Silver films on thickness.

Cadmium Oxide (CdO) thin films are regarded as a material with many attractive properties such as large energy band gap, high transmission coefficient in visible spectral domain, remarkable luminescence characteristics etc. They have found extensive applications in electronic and optical devices. The wide band gap properties of CdO, are of interest particularly for applications such as solar cells and transparent electrodes. Measurements of nonlinear properties are very interesting from the point of the view of optoelectronic and all optical switches. Hence these films are studied in the present work. Using the newly developed measuring system the studies are undertaken and found that the results are matching the theoretical values.

The thesis is organized in six chapters. Chapter 1 defines the problem and explains different theories regarding 1/f noise. Chapter 2 discusses the theoretical aspects of thin films and semiconductors. Chapter 3 explains the design aspects of the developed experimental setup. Chapter 4 illustrates the software involved and list of programmes involved. Chapter 5 presents the studies and analyses the 1/f noise and non-linear effects, and Chapter 6 reports the results with conclusions and gives a scope for future extension of the studies.