## Chapter 1 Basic Concepts of Measurement and Instrumentation

#### 1.1 Introduction

Measurement techniques have been of immense importance ever since the start of human civilization, when measurements were first needed to regulate the transfer of goods in barter trade to ensure that exchanges was fair. The industrial revolution during the nineteenth century brought about a rapid development of new instruments and measurement techniques to satisfy the needs of industrialized production techniques. Since that time, there has been a large and rapid growth in new industrial technology. This has been particularly evident during the last part of the twentieth century, encouraged by developments in electronics in general and computers in particular. This, in turn, has required a parallel growth in new instruments and measurement techniques.

Measurement systems have important vital applications in our everyday lives, whether at home, in our vehicles, offices or factories. We use measuring devices in buying our fruits and vegetables. We assume that the measuring devices are accurate, and we assume that we are all referring to the same units (e.g., kilogram, meter, liter...). The consequence of inaccurate measuring devices in this case leads to financial losses on our part. We check the temperature of our homes and assume that the thermostats reading the temperature are accurate. If not, then the temperature will be either too high or too low, leading to inconvenience and discomfort. We pay for our electricity in units of kWh and we assume that the electricity meter is accurate and faithfully records the correct number of electricity units that we have used. We pay for the water we consume in liters, and we also assume that the water meter is correctly measuring the flow of water in liters. In this case as well, the error will lead to financial loss.

The accuracy of the measurement systems mentioned above is very important, but is more critical in some applications than others. For example, a pharmacist preparing a medication is reliant on the accuracy of his/her scales to make sure he/she includes the correct amounts of ingredients in the medication. Another example is the manufacturing of present-day integrated circuits and photo-masks that requires a high degree of accuracy. Certain chemical reactions require high accuracy in the measurement and control of temperature.

The massive growth in the application of computers to industrial process control and monitoring tasks has spawned a parallel growth in the requirement for instruments to measure, record and control process variables. As modern production techniques dictate working to tighter and tighter accuracy limits, and as economic forces limiting production costs become more severe, so the requirement for instruments to be both accurate and cheap becomes ever harder to satisfy. This latter problem is at the focal point of the research and development efforts of all instrument manufacturers. In the past few years, the most cost-effective means of improving instrument accuracy has been found in many cases to be the inclusion of digital computing power within

# **An Introduction To The Basic Concepts Techniques Of Measurement And Evaluation**

**D** Kirk

An Introduction To The Basic Concepts Techniques Of Measurement And Evaluation:

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In a fast-paced world fueled by information and interconnectivity, the spellbinding force of linguistics has acquired newfound prominence. Its capacity to evoke emotions, stimulate contemplation, and stimulate metamorphosis is really astonishing. Within the pages of "An Introduction To The Basic Concepts Techniques Of Measurement And Evaluation," an enthralling opus penned by a very acclaimed wordsmith, readers embark on an immersive expedition to unravel the intricate significance of language and its indelible imprint on our lives. Throughout this assessment, we shall delve to the book is central motifs, appraise its distinctive narrative style, and gauge its overarching influence on the minds of its readers.

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