PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

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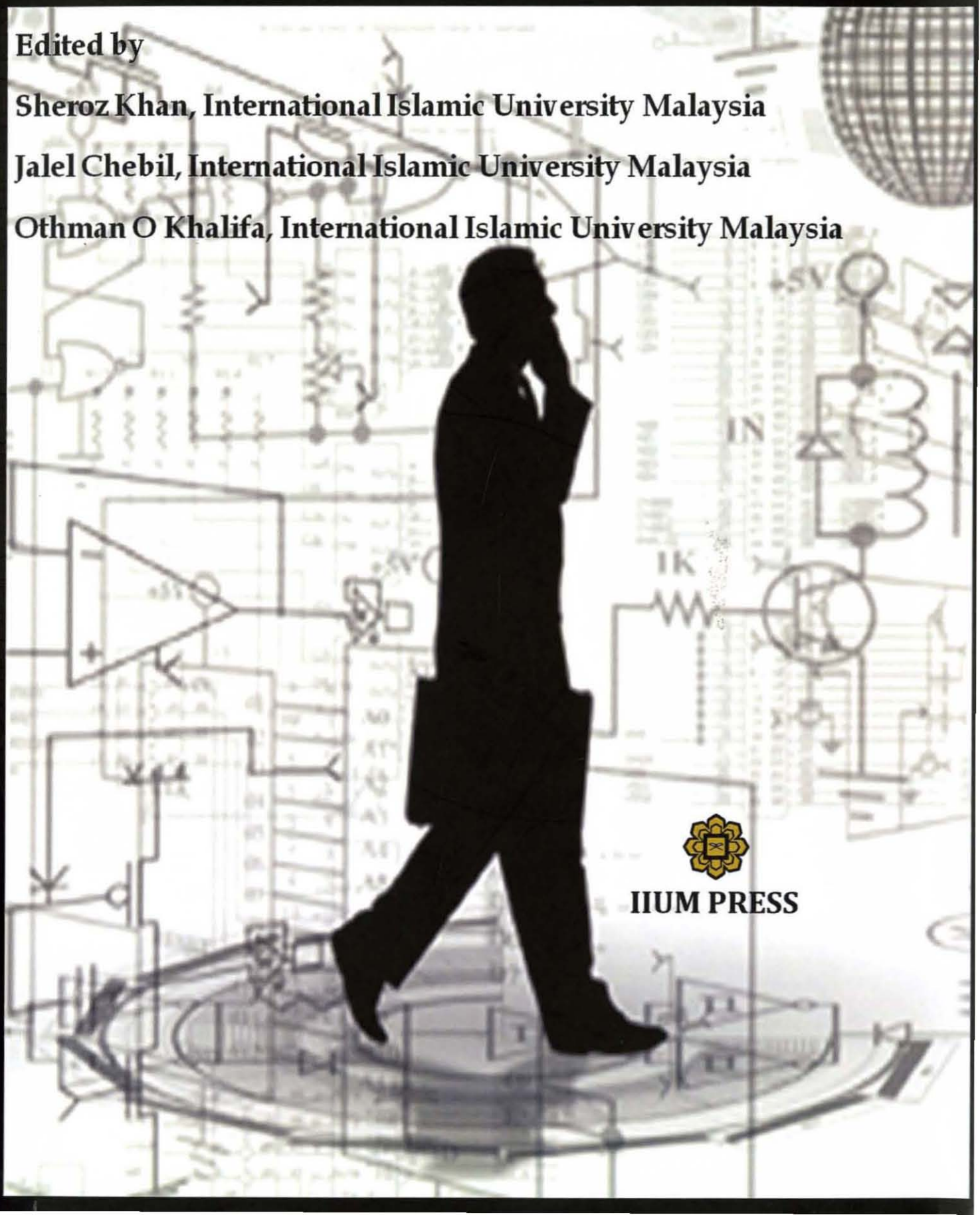

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CONTENTS

Chapter 22

RESPONSE AND INACCURACY ISSUES OF SENSORS

MOHAMMAD ASHRAFUL, SHEROZ KHAN, MUHAMMAD IBRAHIMY

22.0 INTRODUCTION

In recent years, many kinds of sensors are used to get the response of various parameters such as pressure, speed, temperature, etc. Some parameters are highlighted in the following section by giving their measurement procedures.

22.1 TEMPERATURE

Temperature is the most often-measured environmental quantity. This might be expected since most physical, electronic, chemical, mechanical and biological systems are affected by temperature. Some processes work well only within a narrow range of temperatures; certain chemical reactions, biological processes, and even electronic circuits perform best within limited temperature ranges. When these processes need to be optimized, control systems that keep temperature within specified limits are often used. Temperature sensors provide inputs to those control systems. Many electronic components can be damaged by exposure to high temperatures, and some can be damaged by exposure to low temperatures.

Several temperature sensing techniques are currently in widespread usage. The most common of these are RTDs, thermocouples, thermistors, and sensor ICs. The right one for one's application depends on the required temperature range, linearity, accuracy, cost, features, and ease of designing the necessary support circuitry. Here, some characteristics of the most common temperature sensing techniques are highlighted.

For instance, Resistive sensors use a sensing element whose resistance varies with temperature. Platinum RTD (Resistance Temperature Detector) consists of a coil of platinum wire wound around a bobbin, or a film of platinum deposited on a substrate. In either case, the sensors resistance-temperature curve is a nearly-linear function shown is Figure 22.1.