PRINCIPLES OF TRANSDUCER DEVICES AND COMPONENTS

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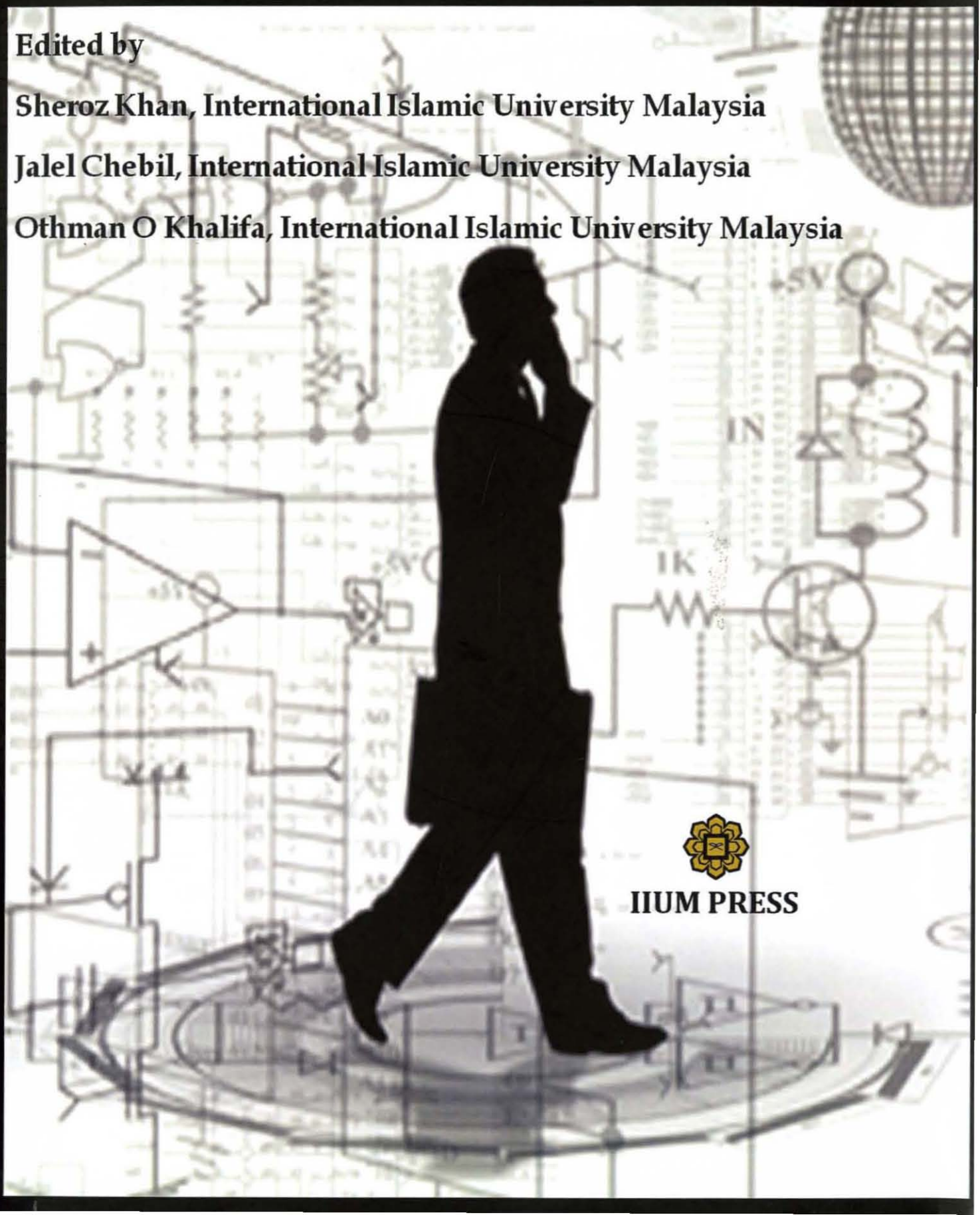

IIUM PRESS

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Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Sheroz Khan, Jalal Chebil & Othman Khalifa: Principles of Transducer Devices and Components

ISBN: 978-967-418-172-7

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed By:
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
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CONTENTS

Chapter 1

RC CIRCUIT RESPONSE

ATIKA ARSHAD, RUMANA TASNIM, SHEROZ KHAN, AHM ZAHIRUL ALAM

1.0 INTRODUCTION

RC circuit consists of a resistor and a capacitor which are connected in series. This chapter focuses on how the voltage develops (or shrinks) with a constant voltage source, V, is turned on (or off). Generally speaking, a capacitor accumulates charge for a current flow in, and obviously current flow out of a capacitor results into charge depletion. The current flow into an uncharged capacitor is maximum, equal to V/R at the instant in time when the circuit is closed, alternatively we can say that an uncharged capacitor acts like a short circuit at t=0. However, current flow drops exponentially to reach zero when capacitor gets fully charged to act like an open circuit. Capacitor unlike a resistor from an electrical view point shows more complex current-voltage relation. Also, besides being a charge storage element, capacitor is like a delay element too with a time constant given by $\tau = RC$.

1.1 CAPACITORS

Capacitor is a device that basically is made of two parallel conducting plates, each of area, A, separated by insulation of thickness, d, as shown in Fig. 1.1. It is a charge storing device, and accordingly it is capable to store energy in the field between the two plates.

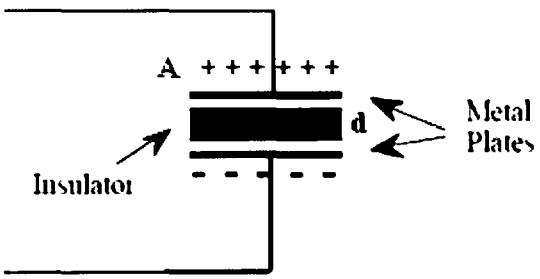

Fig. 1.1: A Simple Capacitor Circuit