

PRINCIPLES OF DIGITAL DESIGN



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Library of Congress Cataloging-in-Publication Data

Gajski, Daniel D.

Principles of digital design / Daniel D. Gajski.

p. cm.

Includes bibliographical references and index.

ISBN 0-13-301144-5

1. Integrated circuits—Design—Data processing. 2. Logic design—Data processing. 3. Computer-aided design. I. Title.

TK7874.034 1997

621.39'5—dc20

96-1339

CIP

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Simon & Schuster / A Viacom Company

Upper Saddle River, New Jersey 07458

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Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

ISBN 0-13-301144-5

Prentice-Hall International (UK) Limited, *London*

Prentice-Hall of Australia Pty. Limited, *Sidney*

Prentice-Hall Canada Inc., *Toronto*

Prentice-Hall Hispanoamericana, S.A., *Mexico*

Prentice-Hall of India Private Limited, *New Delhi*

Prentice-Hall of Japan, Inc., *Tokyo*

Simon & Schuster Asia Pte. Ltd., *Singapore*

Editoria Prentice-Hall do Brasil, Ltda., *Rio de Janeiro*

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7.1 REGISTERS

The simplest of the storage components is a **register** which can be thought of as a bitwise extension of a flip-flop. Each register consists of n flip-flops driven by a common clock signal. In other words, each flip-flop in a given register stores its own data on every rising edge of the clock signal. Thus a simple register has n inputs and n outputs in addition to the clock signal.

In Figure 7.1 we show an example of a 4-bit register. Its graphic symbol, which we use throughout this book, is shown in Figure 7.1(a). The register consists of four D flip-flops connected in parallel as shown in Figure 7.1(b).

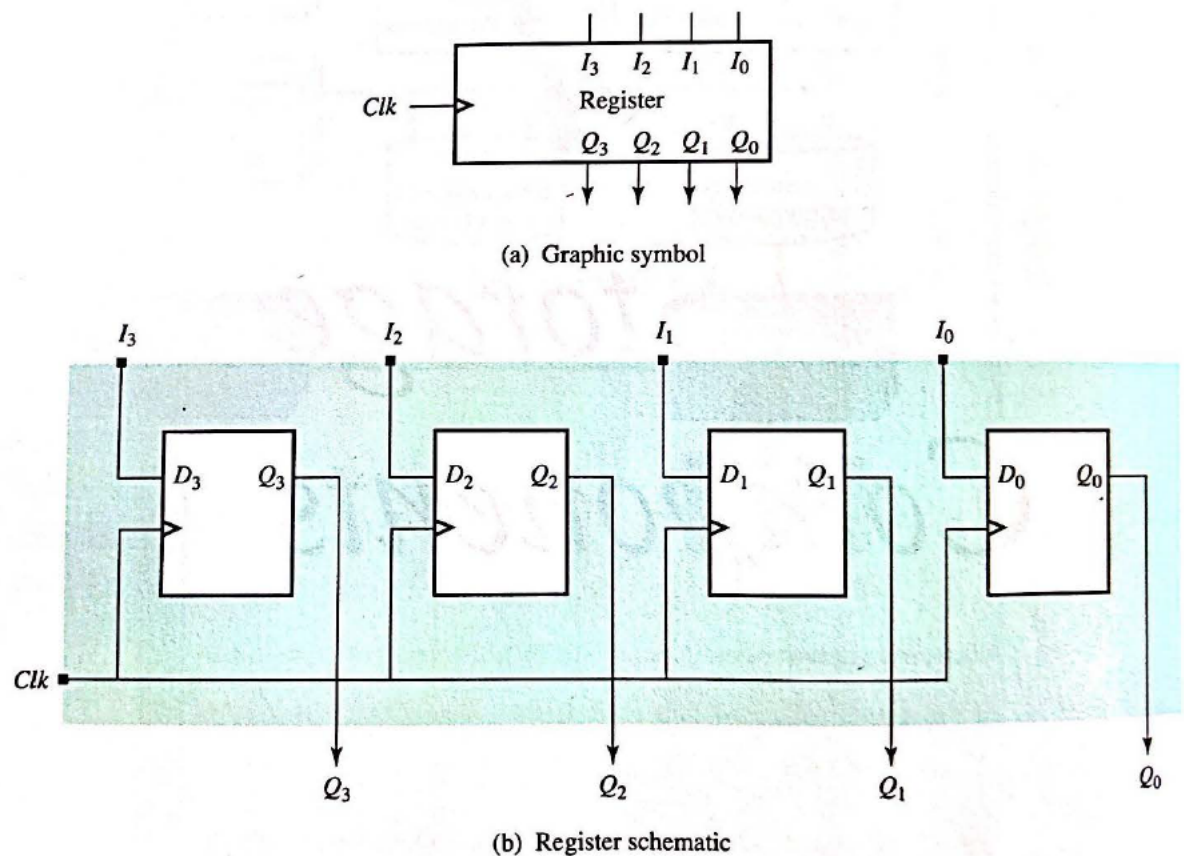


FIGURE 7.1
4-bit register.

The functionality of the basic register in Figure 7.1 can be enhanced by adding different control signals. For example, if the register must be set or reset independent of the clock signal either during power-up or on the occurrence of a special event, we can add an **asynchronous preset** and **clear signals**. Such an enhancement is achieved by replacing the simple flip-flops shown in Figure 7.1 with setable/resetable flip-flops, as shown in Figure 7.2.