EE 200

DIGITAL LOGIC CIRCUIT DESIGN

(3 – 3 – 4)

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Or by appointment

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Introduction to Digital Logic

The material covered in this class will be as follows:

- Introduction.
- Digital and analog quantities.
- Digital system examples.
- Course material.
- Course syllabus.
- Policies on home works, quizzes, exams, and term design project.

After finishing this class, you should be able to:

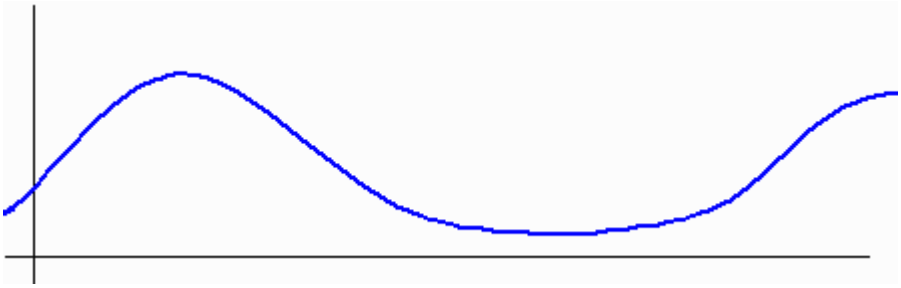
- Identify the importance of this introductory course on digital logic circuit design.
- Appreciate the arrangement of the course material units in relation to each other.
- Become familiar with the assessment method through home works, quizzes, projects and exams.

Introduction:

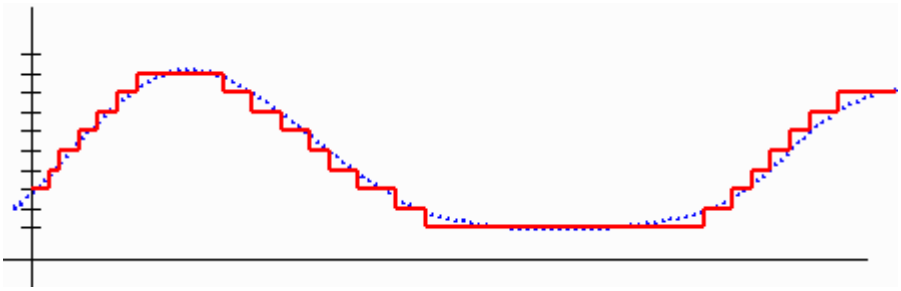
- Prominence of digital systems in everyday life.
- The present time could be referred to as the Digital Age.

- Some examples are the digital computers, mobile phones, digital cameras, digital watches, control systems in cars and aeroplanes…etc.
- Digital systems are used in almost all aspects of life, in communications, business transactions, traffic control, medical treatment, the internet…etc.
- Digital logic is the first course in studying digital systems, which is an essential part of almost all branches of Electrical Engineering.
    - Digital Communications
    - Digital Electronics
    - Digital Control
    - Digital Signal and Image Processing
    - Power System Analysis
- Digital systems are able to manipulate discrete elements of information e.g. 10 decimal digits, 26 letters of the alphabet…etc.
- Discrete elements of information are represented in digital systems by physical quantities called signals. The most common are the voltage and current signals in electronic devices.
- The signals in most present day electronic digital systems use two discrete values (binary signal).
- A binary digit called bit has two values: 0 and 1.
- Discrete elements of information are represented with groups of bits called binary codes.
- A digital system is an interconnection of digital modules. Their operation can be understood from the basic knowledge of digital circuits and their logic functions.
- An important new trend in digital design is the use of hardware description language (HDL). It resembles a programming language and is suitable for describing digital circuits in textual form.
- HDL is used to simulate a digital system and verify its operation before hardware is built.

Analog and Digital Signals



An analog signal



A digital signal

Course contents:

1. BINARY SYSTEMS
   - 1-1 Digital Systems
   - 1-2 Binary Numbers
   - 1-3 Number Base Conversions
   - 1-4 Octal and Hexadecimal Numbers
   - 1-5 Complements
   - 1-6 Signed Binary Numbers
   - 1-7 Binary Codes

2. BOOLEAN ALGEBRA AND LOGIC GATES
   - 2-1 Axiomatic Definition of Boolean Algebra
   - 2-2 Theorems and Properties of Boolean Algebra
   - 2-3 Boolean Functions
   - 2-4 Digital Logic Gates
   - 2-5 Canonical and Standard Forms

3. GATE-LEVEL MINIMIZATION
   - 3-1 Simplification of Boolean Functions Using K-Maps