THE NATIONAL COUNCIL OF EXAMINERS FOR ENGINEERING AND SURVEYING
PRINCIPLES AND PRACTICE OF ENGINEERING EXAMINATION

ELECTRICAL AND COMPUTER
(Depth – Computers)

EFFECTIVE April 2002

The electrical and computer engineering examination is a breadth and depth examination. This means that **all** examinees work the breadth (AM) exam and **one** of the three depth (PM) exams. The breadth exam contains questions from the general field of electrical and computer engineering. The depth exams focus more closely on a single area of practice in electrical and computer engineering. The three depth examinations are Computers; Electronics, Controls and Communications; and Power.

Computers Depth Module (PM)

Approximate Percentage of Examination

I. General Computer Systems **10%**

A. Interpretation of Codes and Standards 4%

1. IEEE Standards
2. ISO Standards

B. Microprocessor Systems 6%

1. Number Systems and Codes
2. Microprocessor Systems
   a. Components
   b. Control Applications
   c. Math Applications
   d. Programmable Logic Controllers
   e. Real-time Operations

II. Hardware **45%**

A. Digital Electronics 16%

1. Memory Devices
2. Medium Scale Integration Devices
3. Programmable Logic Devices and Gate Arrays
4. Tristate Logic
5. Digital Electronic Devices
6. Logic Components
   a. Properties
   b. Fan-In, Fan-Out
   c. Propagation Delay
7. Large Scale Integration
8. Analog to Digital and Digital to Analog Conversion

Approximate Percentage of Examination

B. Design and Analysis 19%

1. Clock Generation/Distribution
2. Memory Interface
3. Processor Interfacing
4. Asynchronous Communication
5. Metastability
6. Races and Hazards
7. State Transition Tables
8. State Transition Diagrams
9. Algorithmic State Machine Charts
10. Timing Diagrams
11. Synchronous State Machines
12. Asynchronous State Machines
13. Pipelining and Parallel Processing
14. Fault Tolerance
15. Sampling Theory

C. Systems 10%

1. Digital Signal Processor Architecture
2. Design for Testability
3. Computer Architecture
4. Mass Storage Devices
5. Input/Output Devices
6. Central Processing Unit Architecture

III. Software **35%**

A. System Software 12%

1. Computer Security
2. Real-Time Operating Systems
3. Error Detection and Control
4. Drivers
5. Time Critical Scheduling

B. Development/Applications 23%

1. Computer Control and Monitoring
2. Software Lifecycle
   a. Requirements Definition
   b. Specification
   c. Design
   d. Implementation and Debugging
   e. Testing
   f. Maintenance and Upgrade
3. Fault Tolerance
4. Modeling and Simulation
5. Software Pipelining
6. Human Interface Requirements

Approximate
Percentage of
Examination

7. Software Design Methods and Documentation
    a. Structured Programming
    b. Top Down or Bottom Up Programming
    c. Successive Refinement
    d. Programming Specifications
    e. Program Testing
    f. Structure Diagrams
    g. Recursion
8. Object Oriented Design
9. Data Structures
    a. Internal
    b. External

IV. Networks **10%**

A. Networks

1. Protocols
    a. TCP/IP
    b. Ethernet
2. Computer Networks
    a. OSI Model
    b. Network Topology
    c. Network Technology
    d. Network Security

TOTAL **100%**

NOTES:

1. The knowledge areas specified under A, B, C, ... etc., are examples of kinds of knowledge, but they are not exclusive or exhaustive categories.

2. Each depth (PM) exam contains 40 multiple-choice questions. Examinee chooses **one** depth exam and works all questions in the depth exam chosen.