

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

ELECTRICAL AND COMPUTER
(Depth—Electronics, Controls, and Communications)

EFFECTIVE October 2005

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.

Electronics, Controls, and Communications Depth Module (PM)	Approximate Percentage of Examination
I. General Electrical Engineering Knowledge	10%
A. Measurement and Instrumentation	4%
1. Transducer Characteristics	
2. Frequency Response	
3. Quantization	
4. Data Evaluation	
B. Interpretation of Codes and Standards	2%
1. Interface Application	
2. Failure Limits	
3. Circuit Protection	
4. Safety Grounding	
5. Electromagnetic Interference and Exposure	
C. Computer Systems	4%
1. Computer Networks	
2. Number Systems and Codes	
II. Electronics	35%
A. Electric Circuit Theory	10%
1. Small-Signal and Large-Signal Models	
2. Active Networks and Filters	
3. Nonlinear Circuits	
4. Two-Port Theory	
B. Electric and Magnetic Field Theory and Applications	7%
1. Transmission Line Models	
2. Electromagnetic Fields	
3. Antennas	
4. Guided Wave Propagation	

Electronics, Controls, and Communications Depth Module (PM)	Approximate Percentage of Examination
C. Electronic Components and Circuits	18%
1. Programmable Logic Devices	
2. Solid-State Power Devices and Applications	
3. Battery Characteristics and Ratings	
4. Power Supplies	
5. Oscillators and Phase-Locked Loop Characteristics	
6. Amplifiers	
7. Modulators and Demodulators	
8. Discrete Components	
9. Diodes	
10. Circuit Protection and Safety	
11. Relays and Switches	
12. Logic Components	
13. Transistors and Applications	
III. Controls	25%
A. Control System Fundamentals	10%
1. Block Diagrams	
2. Characteristic Equations	
3. Frequency Response	
4. Difference Equations and Z-Transforms	
B. Control System Design/Implementation	6%
1. Compensators	
2. Feedback and Feed Forward	
3. Steady-State Error	
C. Stability	9%
1. Stability Test	
2. Bode Plots	
3. Root Locus	
4. Transport Delay	
IV. Communications	30%
A. Communications and Signal Processing	15%
1. Linear Modulation	
2. Angle Modulation	
3. Digital Modulation Techniques	
4. Correlation and Convolution	
5. Fourier Transforms	
6. Signal Processing	
7. Spread Spectrum Modulation Characteristics	
B. Noise and Interference	8%
1. Signal-to-Noise Ratio	
2. Quantization Noise	
3. Noise Figure and Temperature	
4. Interference	
5. Random Variables	
6. Error Detection and Correction	

Electronics, Controls, and Communications Depth Module (PM)

Approximate Percentage
of Examination

C. Telecommunications	7%
1. Wireless Communications	
2. Radio Wave Propagation	
3. Optical Communications	
4. Multiplexing	
5. Circuit Switching	
6. Packet Switching	
7. Wireline Communications	
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.