
**ELECTRICAL ENGINEERING EXAMINATIONS
SYLLABUS**

GROUP A

COMPULSORY EXAMINATIONS (7 REQUIRED)

98-Elec-A1 Circuits

Nodal and mesh analysis of linear, finite, passive circuits; equivalent networks. Steady state AC response of lumped constant, time-invariant networks. Time and frequency response of linear systems: impulse response and transfer functions, Laplace transform analysis, frequency response, including steady-state sinusoidal circuits.

98-Elec-A2 Control

Models, transfer functions, and system response. Root locus analysis and design. Feedback and stability: Bode diagrams. Nyquist criterion, frequency domain design. State variable representation. Simple PID control systems.

98-Elec-A3 Communications

Amplitude and frequency modulation systems: signals, spectra, implementation. Sampling of continuous signals and the Nyquist sampling theorem. Fourier series and transforms, spectral concepts. Discrete signals and systems: the sampling theorem, time and frequency response, the Z-transform. PCM and simple baseband pulse code modulation systems.

98-Elec-A4 Digital Systems and Computers

Combinatorial and sequential switching circuits. Register level design of digital systems. Computer memories. Computer architecture, assembly language programming, interrupts, and interfacing.

98-Elec-A5 Electronics

Semiconductor devices; diodes and thyristors. Bipolar and field effect transistors as linear devices and switches. Small signal amplifiers. Operational amplifiers and comparators. Digital circuits and logic families. Small signal amplifiers. Digital circuits and logic families.

98-Elec-A6 Electromagnetic Energy Conversion

Magnetic circuits. Three - phase circuits. Transformer equivalent circuit at both low frequency and high frequency. Electromagnetic and electrostatic force calculations. AC machines and stepper motors. Permanent magnet DC machines.

98-Elec-A7 Electromagnetics

Field concepts. Maxwell's equations. Free space and guided wave propagation, transmission lines. Radiation from current elements.

GROUP B

ELECTIVE EXAMINATIONS (2 REQUIRED)

98-Elec-B1 Advanced Circuits Analysis and Design

Network equilibrium equations. Two port analysis. Classical passive filter design. Non linear operational amplifier applications and active filters. Principles of computer aided design tools: frequency and time domain analysis; transmission line effects; sensitivity analysis. Scattering matrix description of microwave devices.

98-Elec-B2 Digital Signal Processing

Discrete system theory: convolution, Z-transforms, transfer functions. Design and implementation of digital filters. Spectral analysis, DFT and FFT implementations. Implementation; DSP chips architecture and programming.

98-Elec-B3 Advanced Control Systems

Modelling of engineering systems; state variables and transfer function representations. Analytical and numerical solutions of state variable equations. Observability, controllability, stability; classical design, stabilization by pole assignment. Systems with delay. Systems with noise. Computer control, discrete systems. System identification; least squares.

98-Elec-B4 Communications Systems

Sampling, A/D conversion, source coding; signal sets, line codes, modulation, optimal reception, demodulation, performance in noisy channels, error detecting and correcting codes. Public Switch Telephone Networks, television standards. Radio communications; link analysis and performance, terrestrial and satellite communications; personal communication networks; cellular telephone networks.

98-Elec-B5 Advanced Electronics

Device models and implementation in computer aided analysis packages. Multi-stage amplifiers, oscillators, non-linear circuits. Power amplifiers and linear regulators. Communication circuits; phase locked loops, filters, modulator/demodulators. Electronic instrumentation and measurement. Microwave circuits; properties of microwave tubes and semi-conductor devices.

98-Elec-B6 Integrated Circuit Engineering

Integrated Circuit Design: MOS circuit design methods; specification; use of CAD design tools. Non-ideal effects. Mask level layout. Integrated Circuit Fabrication: basic knowledge of IC processing techniques. Digital and analog IC's: basic building blocks. Design considerations for submicron CMOS and bipolar devices.

98-Elec-B7 Power Systems Engineering

Power system representation and analysis. Components: transmission lines, transformers, synchronous machines. Distribution: loads, power flow, operations, and control. Fault analysis: short circuits, balanced and unbalanced operation. System stability.

98-Elec-B8 Switched Mode Power Supply Design

Control of electrical power with semiconductor devices -- Specifications and requirements. Design of high frequency magnetic devices. Power supply models and control methods. Harmonic analysis. Filter design and EMC issues. Heatsink calculations.

98-Elec-B9 Power Electronics and Drives

Construction and modelling of electric machines; induction, synchronous, permanent magnet DC, stepper motors. Electronic power converters; choppers, DC link inverters, cycloconverters, current source inverters. Torque and speed controllers. Vector oriented control techniques.

98-Elec-B10 Electromagnetic Field, Transmission Lines, Antennas, and Radiation

Field radiation equations. Distributed circuits: steady-state transmission line equations; impedance transformation, Smith charts, matching. Transients. Coaxial lines, waveguides. Antennas: infinitesimal elements, linear antennas, radiation resistance, antenna patterns, gain. Other types of antennas.

98-Elec-B11 Electro-Optical Engineering

Optical transmission: waveguide modes, fibre optic propagation characteristics. Optoelectronics: lasers, sources and detectors, couplers, modulators, guided wave devices. Applications.

**The Association of
PROFESSIONAL ENGINEERS AND GEOSCIENTISTS
of British Columbia**

1998 ELECTRICAL ENGINEERING SYLLABUS
Checklist for Self Evaluation
(Not required for candidates who are assigned
confirmatory exams)

Name: _____

Exam Number	Exam Name	Applicant's Self-Evaluation - Course Equivalent	For Office Use Only
<i>Basic Studies (6 Required)</i>			
98-BS-1	Mathematics		
98-BS-2	Probability and Statistics		
98-BS-4	Electric Circuits and Power		
98-BS-5	Advanced Mathematics		
98-BS-8	Digital Logic Circuits		
98-BS-9	Basic Electromagnetics		
<i>Basic Studies (2 required)</i>			
98-BS-3	Statics and Dynamics		
98-BS-6	Mechanics of Materials		
98-BS-7	Mechanics of Fluids		
98-BS-10	Thermodynamics		
98-BS-11	Properties of Materials		
<i>Group A (7 required)</i>			
98-Elec-A1	Circuits		
98-Elec-A2	Control		
98-Elec-A3	Communications		
98-Elec-A4	Digital Systems and Computers		

98-Elec-A5	Electronics		
98-Elec-A6	Electromagnetic Energy Conversion		
98-Elec-A7	Electromagnetics		
<i>Group B (2 Required)</i>			
98-Elec-B1	Advanced Circuits Analysis and Design		
98-Elec-B2	Digital Signal Processing		
98-Elec-B3	Advanced Control Systems		
98-Elec-B4	Communication Systems		
98-Elec-B5	Advanced Electronics		
98-Elec-B6	Integrated Circuit Engineering		
98-Elec-B7	Power Systems Engineering		
98-Elec-B8	Switched Mode Power Supply Design		
98-Elec-B9	Power Electronics and Drives		
98-Elec-B10	Electromagnetic Field, Transmission Lines, Antennas, and Radiation		
98-Elec-B11	Electro-Optical Engineering		
<i>Complementary Studies (All Required)</i>			
98-CS-1	Engineering Economics		
98-CS-2	Engineering in Society - Health, Safety, and the Environment		
98-CS-3	Management Concepts for Engineers		

Professional Electrical Text List

**** NOTE TO CANDIDATES, THE LISTED TEXTBOOKS BELOW ARE ONLY SUGGESTED. THE LIST DOES NOT DEFINE OR LIMIT THE SYLLABUS.**

98-Elec-A1 - Circuits

Johnson, Electric Circuit Analysis, 3rd edition. John Wiley.

J.D. Irwin, Basic Engineering Circuit Analysis, MacMillan.

Haykin and Van Veen, Signals and Systems, Wiley, 1999.

Sinha, Linear Systems, Wiley.

98-Elec-A2 - Control

Dorf, Modern Control Systems, 8th edition. Addison-Wesley.

98-Elec-A3 - Communications

Haykin, Simon, Communication Systems, latest edition, John Wiley & Sons, 1983.

Oppenheimer, Signals and Systems, 2nd edition. Prentice-Hall.

98-Elec-A4 - Digital Systems and Computers

Tocci & Widmar, Digital Systems, 7th edition. Prentice Hall, 1998.

Kleitz, Digital Electronics, 4th edition. Prentice Hall, 1996.

98-Elec-A5 - Electronics

Sedra and Smith, Microelectronic Circuits, 4th edition. Oxford University Press.

Boylestad and Nashelsky et. al., Electronic Devices and Circuit Theory, Prentice Hall, latest edition. ISBN 0-130-86830-2

98-Elec-A6 - Electromagnetic Energy Conversion

Sen, P.C., Principles of Electrical Machines and Power Electronics, John Wiley and Sons Inc. ISBN 0-471-85084-5

98-Elec-A7 - Electromagnetics

Demarest, Engineering Electromagnetics. Prentice-Hall.

Staelin, D.H., Morgenthaler, A.W. and Kong, J.A., Electromagnetic Waves. Prentice Hall, 1994.

98-Elec-B1 - Advanced Circuits Analysis and Design

Nilsson, J. and Reidel S., Electric Circuits, Prentice-Hall, ISBN 0-130-32120-6

Decralo, Raymond A., and Lin, Pen-Min, Linear Circuit Analysis, Prentice-Hall, 1995 ISBN 0-134-73869-1

Liao, Samuel Y., Microwave Devices Uncircuits, Prentice-Hall, 1990 ISBN 0-135-83204-7

98-Elec-B2 - Digital Signal Processing

Jackson, Kluwer, Digital Filters and Signal Processing.

98-Elec-B3 - Advanced Control Systems

The Art of Control Engineering, Dutton, Addison-Wesley.

98-Elec-B4 - Communications Systems

Tanenbaum, Computer Networks, 3rd edition. Prentice-Hall.

98-Elec-B5 - Advanced Electronics

Boylestad and Nashelsky et. al., Electronic Devices and Circuit Theory, Prentice Hall, latest edition. ISBN 0-130-86830-2

98-Elec-B6 - Integrated Circuit Engineering

Jan A Rabaey, Digital Integrated Circuits, Prentice-Hall.

98-Elec-B7 - Power Systems Engineering

Charles A. Gross, Power Systems Analysis, John Wiley & Sons, latest edition, ISBN #0-471-862-06-1

B.M. Weedy, Electric Power Systems, latest edition, John Wiley and Sons Inc., 1987.

M.E. El-Hawary Electrical Power Systems: Design and Analysis IEEE Press, 1996 ISBN# 0-7803-1140-X

98-Elec-B8 - Switched Mode Power Supply Design

Billings, Switched Mode Power Supply Handbook. McGraw-Hill.

98-Elec-B9 - Power Electronics and Drives

M.H. Rashid, Power Electronics: Circuits, Devices and Applications, Prentice Hall, latest edition, 1988. ISBN 0-136-87667-6.

98-Elec-B10 - Electromagnetic Field, Transmission Lines, Antennas, and Radiation

Demarest, Engineering Electromagnetics. Prentice-Hall.

98-Elec-B11 - Electro-Optical Engineering

Yariv, Optical Electronics. Saunders College Publishing.

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