
ELECTRICAL ENGINEERING EXAMINATIONS SYLLABUS

GROUP A

COMPULSORY EXAMINATIONS (7 REQUIRED)

07-Elec-A1 Circuits

Electric circuit components: lumped parameter models. Nodal and mesh analysis of linear, passive circuits; equivalent networks. Steady state analysis of lumped parameter, time-invariant circuits: differential equation formulation, sinusoidal inputs, frequency response, impulse response, and transfer functions. Laplace transform analysis and circuit transient response. Two-port circuit models and analysis.

07-Elec-A2 Systems and Control

System models, impulse response functions, and transfer functions. System input-output and convolution. Root locus analysis and design. Feedback and stability: Bode diagrams. Nyquist criterion, frequency domain design. State variable representation. Simple PID control systems.

07-Elec-A3 Signals and Communications

Analysis of continuous-time signals: Fourier series and Fourier transform; magnitude, phase, and power spectra. Analysis of discrete-time signals: Nyquist sampling theorem; the Z-transform. Analog communication systems: amplitude and frequency modulation and demodulation. Digital communication systems: pulse code modulation; bandpass modulation and demodulation techniques.

07-Elec-A4 Digital Systems and Computers

Combinational, sequential, and synchronous logic circuits. Register level design of digital systems. Computer arithmetic, central processing unit, memory systems and peripherals. Assembly language programming, interrupts, and interfacing and communication. Computer architecture..

07-Elec-A5 Electronics

Semiconductor devices; diodes and thyristors. Bipolar and field effect transistors as linear devices and switches. Bias circuits, basic amplifiers, small-signal equivalent circuits, transfer functions, and frequency response. Operational amplifiers and comparators. Digital integrated circuits and logic families: TTL, TTL-LS, and CMOS.

07-Elec-A6 Power Systems and Machines

Magnetic circuits and transformers. Wye and delta connected three-phase systems. Generation, transmission, and distribution of electric power. Three-phase transformers. AC and DC machines. Three-phase synchronous machines and three phase induction motors.

07-Elec-A7 Electromagnetics

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

GROUP B - ELECTIVE EXAMINATIONS (2 REQUIRED)

07-Elec-B1 Digital Signal Processing

Discrete-time signals and systems: system input-output and convolution, Z-transform and transfer functions. Discrete-time Fourier transform (DFT) and Fast Fourier transform (FFT). Design of finite impulse response (FIR) and infinite impulse response (IIR) filters. DSP implementation considerations.

07-Elec-B2 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.

07-Elec-B3 Digital Communications Systems

A/D conversion, source coding; signal sets, line codes, modulation, optimal reception, demodulation, performance in noisy channels, error detecting and correcting codes. Radio communications; link analysis and performance, terrestrial and satellite communications.

07-Elec-B4 Information Technology Networks

Layered architecture, circuit-switching networks, peer-to-peer protocols and data link layer, medium access control protocols, local area networks, packet-switching networks, TCP/IP, ATM networks, cellular networks, paging and wireless networks, telephone networks.

07-Elec-B5 Advanced Electronics

Device models: circuit behaviour, high frequency, and feedback. Multi-stage amplifiers, oscillators, current mode op-amps, non-linear circuits. Power amplifiers and linear regulators. Instrumentation: differential amps, optical isolators, and analog-digital and digital-analog converters.

07-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. Electronic instrumentation and measurement. Microwave circuits; properties of microwave tubes and semi-conductor devices.

07-Elec-B7 Power Systems Engineering

Power system representation and analysis. Components: power transmission lines, transformers, synchronous machines. Distribution: power flow, operations, and control. Fault analysis and power system protection. System stability.

07-Elec-B8 Power Electronics and Drives

Principles and modelling of electric machines: dc machines, induction machines, and synchronous machines. Power electronic devices and converters: choppers, inverters, cycloconverters, and switched power supplies. Electric drives: torque and speed control, and field and vector oriented control techniques.

07-Elec-B9 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.

07-Elec-B10 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

2007 ELECTRICAL ENGINEERING SYLLABUS

Checklist for Self Evaluation

(Not required for candidates who are assigned confirmatory exams)

Name: _____

Exam Number	Exam Name	Applicants Self Evaluation – Course Equivalent	For Office Use Only
<i>Basic Studies (6 Required)</i>			
04 -BS-1	Mathematics		
04-BS-2	Probability and Statistics		
04-BS-4	Electric Circuits and Power		
04-BS-5	Advanced Mathematics		
04-BS-8	Digital Logic Circuits		
04-BS-9	Basic Electromagnetics		
<i>Basic Studies (2 required)</i>			
04-BS-3	Statics and Dynamics		
04-BS-6	Mechanics of Materials		
04-BS-7	Mechanics of Fluids		
04-BS-10	Thermodynamics		
04-BS-11	Properties of Materials		
<i>Group A (7 required)</i>			
07-Elec-A1	Circuits		
07-Elec-A2	Systems & Control		
07-Elec-A3	Signals & Communications		
07-Elec-A4	Digital Systems and Computers		
07-Elec-A5	Electronics		

07-Elec-A6	Power Systems and Machines		
07-Elec-A7	Electromagnetics		

Group B (2 Required)			
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07-Elec-B1	Digital Signal Processing		
07-Elec-B2	Advanced Control Systems		
07-Elec-B3	Digital Communications Systems		
07-Elec-B4	Information Technology Networks		
07-Elec-B5	Advanced Electronics		
07-Elec-B6	Integrated Circuit Engineering		
07-Elec-B7	Power Systems Engineering		
07-Elec-B8	Power Electronics and Drives		
07-Elec-B9	Electromagnetic Field, Transmission Lines, Antennas, and Radiation		
07-Elec-B10	Electro-Optical Engineering		

Complementary Studies (All Required)			
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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.**

07-ELEC-A1 – CIRCUITS

Nilsson, James W. and Susan Riedel, Electric Circuits, 7th Edition. Prentice Hall, 2004.
Alexander, Charles and Mathew Sadiku, Fundamentals of Electric Circuits, 3rd Edition. McGraw Hill, 2007.
Schwarz and Oldham, Electrical Engineering: An Introduction, 2nd Edition. Oxford University Press, 1993.

07-ELEC-A2 – SYSTEMS AND CONTROL

Dorf, Richard C. and Robert H. Bishop, Modern Control Systems, 10th Edition. Addison-Wesley, 2004.
Nise, Norman S., Control Systems Engineering, 4th Edition, Wiley, 2003.

07-ELEC-A3 – SIGNALS AND COMMUNICATIONS

Haykin, Communication Systems, 4th Edition, John Wiley & Sons Canada Ltd., 2000.
Or
Haykin, Simon & Michael Moher, Introduction to Analog and Digital Communication Systems, 2nd Edition, John Wiley & Sons, 2006.
Lathi, B.P., Signal Processing and Linear Systems. Oxford University Press, 2000.
ISBN: 13-97801952191173
or
Haykin, Simon & Barry Van Veen, Signals and Systems, 2005 Interactive Solutions Edition, 2nd Edition, John Wiley & Sons Canada Ltd., 2005.

07-ELEC-A4 - DIGITAL SYSTEMS AND COMPUTERS

Brey, Barry, The Motorola Microprocessor Family: 68000, 68008, 68010, 68020, 68030, and 68040: Programming and Interfacing with Applications. Saunders College Publishing, 1995.

07-ELEC-A5 – ELECTRONICS

Sedra and Smith, Microelectronic Circuits, 5th Edition. Oxford University Press, 2003.

07-ELEC-A6 – POWER SYSTEMS AND MACHINES

Chapman, Stephen, Electric Machinery and Power System Fundamentals, McGraw Hill, 2001.
Wildi, Theodore, Electrical Machines, Drives, and Power Systems, 6th Edition, Prentice Hall, 2005.

07-ELEC-A7 – ELECTROMAGNETICS

Hayt, William H. and John A. Buck, Engineering Electromagnetics. McGraw Hill, 2006. ISBN: 0073104639.

07-ELEC-B1 - DIGITAL SIGNAL PROCESSING

Ifeachor, Emmanuel, and Barrie Jervis, Digital Signal Processing, a Practical Approach, 2nd Edition. Prentice Hall, 2001.

Mitra, Sanjit, Digital Signal Processing, a Computer-Based Approach, 3rd Edition. McGraw Hill, 2006.

07-ELEC-B2 - ADVANCED CONTROL SYSTEMS

Dutton, Ken, Steve Thompson, and Bill Barraclough, The Art of Control Engineering. Prentice Hall, 1997.

Nise, Norman, Control Systems Engineering. John Wiley, 2005.

07-ELEC-B3 – DIGITAL COMMUNICATIONS SYSTEMS

Couch, Leon W., Digital and Analog Communication Systems, 7th Edition. Prentice Hall, 2007. ISBN: 013-142420.

Lathi, B. P., Modern Digital and Analog Communication Systems, 3rd Edition. Oxford University Press, 1998, ISBN13: 978-0-19-511009-8.

Sklar, Bernard, Digital Communications Fundamentals and Applications, 2nd Edition, Prentice Hall, 2001.

07-ELEC-B4 – INFORMATION TECHNOLOGY NETWORKS

Leon-Garcia, Alberto, and Indra Widjaja, Communication Networks, 2nd Edition. McGraw-Hill, 2003.

Freeman, Roger L., Telecommunication System Engineering, 4th Edition. John Wiley & Sons Canada, Ltd. 2004.

Rappaport, Theodore S., Wireless Communications: Principles and Practice, 2nd Edition. Prentice Hall, 2001.

07-ELEC-B5 - ADVANCED ELECTRONICS

Sedra and Smith, Microelectronic Circuits, 5th Edition. Oxford University Press, 2003.

Horowitz, Paul, and Winfield Hill, The Art of Electronics, 2nd Edition. Cambridge University Press, 1989.

07-ELEC-B6 - INTEGRATED CIRCUIT ENGINEERING

Rabaey, Jan A., Anantha Charndrakasan and Borivoje Nikolic, Digital Integrated Circuits, 2nd Edition. University of California, Berkeley, Prentice-Hall, 2003. ISBN# 01-0130909963.

07-ELEC-B7 - POWER SYSTEMS ENGINEERING

Glover, J. Duncan, and Mulukutla Sarma, Power System Analysis and Design, 3rd Edition. Thomson Learning, 2002.

Grainger, John and William Stevenson Jr., Power System Analysis. McGraw Hill, 1994.

07-ELEC-B8 - POWER ELECTRONICS AND DRIVES

Rashid, Muhammad H., Power Electronics: Circuits, Devices and Applications, 3rd Edition. Prentice-Hall, 2003.

Mohan, N, Undeland, T, Robbins, W, Power Electronics – Converters, Applications, and Design. John Wiley, 2003, ISBN 0-471-22693-9.

Sen, P C., Principles of Electric Machines and Power Electronics, 2nd Edition. Wiley, 1996.

07-ELEC-B9 - ELECTROMAGNETIC FIELD, TRANSMISSION LINES, ANTENNAS, AND RADIATION

Ulaby, Farwaz, Fundamentals of Applied Electromagnetics, 5th Edition. Prentice Hall, 2007. ISBN: 013-2413264.

07-ELEC-B10 - ELECTRO-OPTICAL ENGINEERING

YARIV, AMNON, AND POCHI YEH, PHOTONICS: OPTICAL ELECTRONICS IN MODERN COMMUNICATION, 6TH EDITION. OXFORD UNIVERSITY PRESS, 2006