

# Radio Amateurs of/du Canada

## RAC Maple Leaf Operators Advanced Qualification Course

### Spring 2020: Course Syllabus

#### Session 1 – April 5 or 6

##### Study Guide sections: 1.1 through 1.15

- A001-001 RC and RL time constants
- A001-002 Skin effect, capacitance, electromagnetic fields
- A001-003 Series RLC circuits: calculations
- A001-004 Parallel RLC circuits: calculations
- A001-005 RLC Circuit Q: calculations
- Total: 54 questions – 10%

#### Session 2 – April 12 or 13

##### Study Guide sections: 1.16, 2.1 through 2.9 and 4.1 through 4.16

**Note: Sessions 2 and 4 deal with all 121 questions in section A002 – 22%**

- A002-001 Semiconductor materials, P vs N material, doped vs non-doped materials
- A002-002 Diodes: zener, varactor, junction vs point-contact diodes
- A002-005 Silicon-controlled rectifiers
- A002-006 Amplifiers: Classes A, B, AB, C; efficiency, phase, linearity
- A002-009 Mixers and multipliers
- A002-011 Crystal lattice filters, crystal oscillators
- A002-012 LC filters: Butterworth, Chebyshev, cavities, helical resonators
- Total: 77 questions – 14%

#### Session 3 – April 19 or 20

##### Study Guide sections: 11.1 through 11.9

- A003-001 Peak-to-peak vs RMS; sinewaves, AC vs DC measurements
- A003-002 PEP vs RMS for RF power; Ohm's Law for power, PEP calculation, RF power measurement
- A003-003 Dip meters, signal generators, FM SINAD measurement
- A003-004 Frequency counters, timebase, marker generator, crystal calibrator
- A003-005 Oscilloscopes: use, accuracy
- A003-006 Voltmeters, ammeters, shunts
- Total: 66 questions – 12%



Gold Level



Silver Level



Bronze Level



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## Session 4 – April 26 or 27



### Study Guide sections: 2.10 through 2.15, 4.10 and 5.1 through 5.15

- A002-003 Bipolar transistors: alpha, beta, common-base and common-emitter circuits
- A002-004 FETs, JFETs, MosFETs
- A002-007 FET input and output impedance; inputs vs outputs of bipolar circuits; common base, common emitter, common collector; FETs vs Bipolars
- A002-008 Op-Amps
- A002-010 Logic circuits: NAND AND OR NOR XOR XNOR Flip-flops
- Total: 55 questions – 10%

## Session 5 – May 3 or 4

### Study Guide sections: 9.1, 9.3 through 9.6, 9.8 through 9.10 and 13.1 through 13.9

- A005-001 Oscillators: Hartley, Colpitts, Pierce, VFOs, PLLs
- A005-002 Amplifier design: PI networks, PI-L networks, grounded-grid triode, bypass caps on filaments, shielding
- A005-003 Amplifier parasitics, neutralisation
- A005-004 SSB: balanced modulator, carrier suppression, PEP, 2-tone testing
- A005-007 SSB transmitters, DSP
- Total: 55 questions – 10%

## Session 6 – May 10 or 11

### Study Guide sections: 9.2, 9.7 and 6.1 through 6.5

**Note: Sessions 5 and 6 deal with all 99 questions in Section A005 – 18%**

- A005-005 FM: modulation index, deviation, central frequency
- A005-006 Intermod, phase modulation, repeaters, cavity filters
- A005-008 Digital: ASCII, Baudot, ARQ, AX.25, Forward Error Correction, APRS
- A005-009 Spread Spectrum
- Total: 44 questions – 8%

## Session 7 – May 17 or 18

### Study Guide sections: 3.1 through 3.15

- A004-001 Power supplies: transformers, rectifiers, ripple, AC voltage double, HV PSUs
- A004-002 DC filters: capacitor and choke; regulation; bleeder resistors
- A004-003 Regulated power supplies: linear regulators, switching, zeners as voltage regulators, regulator ICs
- A004-004 PSU regulation
- Total: 44 questions – 8%



Radio Amateurs of Canada (RAC) is the national association for Amateur Radio in Canada.

It is a not-for-profit membership association with its headquarters in Ottawa, Ontario, Canada, representing the interests of Amateur Radio across Canada.

RAC is the Canadian voting member society of the International Amateur Radio Union (IARU).

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## Session 8 – May 31 or 1 June 1

### Study Guide sections: 8.1 through 8.10

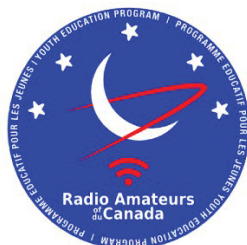
- A006-001 Superhet receivers: single- and double-conversion
- A006-002 Superhet receivers: IF, BFO, mixer
- A006-003 Receivers: noise floor, purposes of stages in a receiver, SINAD (FM)
- A006-004 Receivers: product detector, AGC, BFO
- A006-005 Receivers: selectivity, desense, intermod
- Total: 55 questions – 10%



## Session 9 – 7 or 8 June 7 or 8

### Study Guide sections: 14 and 15

- A007-001 Antenna tuners: transformers, series, L-network, PI network
- A007-002 Transmission lines: 1/4-wave xfmrs, 1/2-wave xfmrs, velocity factor
- A007-003 Feeding antennas: T-match, gamma, omega, delta, stub
- A007-004 Antennas: current and voltage distribution, impedance
- A007-005 Antennas: polarization (horizontal, vertical, circular), Doppler, cross-polarization, helicals, parabolics
- Total: 55 questions – 10%



## Session 10 – 14 or 15 June 2020

### Study Guide sections: 14 and 15

- A007-006 Antennas: feedline loss, ERP, SWR, dB
- A007-007 Antennas: influence of height on directivity, wave angle, dipole impedance, near vertical incidence skywave (NVIS)
- A007-008 Antennas: radiation resistance, interaction, beamwidth, efficiency
- A007-009 Antennas: waveguide, microstripline
- Total: 44 questions – 8%



Radio Amateurs du Canada (RAC) est l'association nationale pour la radio amateur au Canada.

RAC est une association sans but lucratif localisée à Ottawa, Ontario, Canada, qui représente les intérêts du radioamateurisme partout dans ce pays.

De plus, RAC exerce le droit de vote du Canada dans l'Union internationale des radioamateurs (IARU).

### Dates to be arranged:

Advanced Examination by ISED Accredited Examiners in your province or territory.

For complete information on the course please visit our website at:

<https://www.rac.ca/amateur-radio-courses/rac-online-advanced-course/>

Contact information: [advancedcourse@rac.ca](mailto:advancedcourse@rac.ca)