



European Radiocommunications Committee (ERC)
within the European Conference of Postal and Telecommunications Administrations (CEPT))

**AMATEUR RADIO NOVICE EXAMINATION SYLLABUS AND
AMATEUR RADIO NOVICE EXAMINATION CERTIFICATE
WITHIN CEPT AND NON-CEPT COUNTRIES**

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1 INTRODUCTION

There are three different amateur radio licence levels described in the CEPT:

1. The CEPT Recommendation T/R 61-02 makes it possible for CEPT administrations to issue a Harmonised Amateur Radio Examination Certificate (HAREC). This Certificate shows proof of successfully passing an amateur radio examination that complies with the Examination Syllabus for HAREC. It facilitates the issuing of an individual licence to a radio amateur returning to his native country showing this document issued by a foreign CEPT Administration after passing an amateur radio examination in that foreign country.
2. Due to the high level standard of the technical theory of the HAREC examination syllabus, this ERC Report describes a medium-level examination with a lower standard than required under the Harmonised Amateur Radio Examination Certificate (HAREC), suitable for the amateur radio novice class licence. A reason to establish this ERC Report on this topic is the uncertainty of the establishing and/or the implementation of the novice class licence by several CEPT administrations.
3. ECC Report 89 describes a third level, the ENTRY-CLASS, a lowest level of examination syllabus and its administration.

2 AMATEUR RADIO NOVICE EXAMINATION SYLLABUS

The Amateur Radio Novice Class requires knowledge of essential main subjects as described in the examination syllabus in Annex 2 of this report and permits also the experience with anomalous propagation modes, digital transmission modes in combination with computer techniques, antenna experiments, home construction of equipment, and operating practice.

The amateur radio novice examination syllabus and the amateur radio novice examination certificate, given in this Report, could be used as a **guideline** for National administrations wishing to introduce a new or change the national amateur radio novice class licence.

Furthermore, each CEPT and NON-CEPT Administration may decide to recognise novice class licences granted by other administrations to allow holders of national amateur radio novice licences to obtain a similar class licence, based on this report. The national amateur radio novice examination syllabus should contain at least technical, operational and regulatory elements. Emphasis may be put on a practical examination together with operating practice as is usual on the amateur bands. The proposed amateur radio novice examination syllabus is shown in Annex 2.

This Report provides the amateur radio novice examination syllabus in support of ECC Recommendation (05)06 on the CEPT Novice Radio Amateur Licence. Any non-CEPT administration wishing to declare conformity with ECC Recommendation (05)06 can do so by providing a 'Statement of Conformity' (SOC)' as contained in Annex 5 of ECC Recommendation (05)06. The final approval for applications by non-CEPT administrations would still be subject to the agreement of CEPT administrations.

3 PROCEDURE FOR ISSUING AN AMATEUR RADIO NOVICE LICENCE AND EXAMINATION CERTIFICATE

This ERC Report suggests a procedure for issuing an Amateur Radio Novice Examination Certificate (Annex 1), and the criteria for the National Novice Examination. Appropriate conditions for the Amateur Radio Novice Licence shall be at the discretion of National administrations.

3.1 Issuing an Amateur Radio Novice Examination certificate

An Amateur Radio Novice Examination Certificate may be issued by administrations to persons who have passed a national Novice examination that meets the criteria set out in paragraph 3.2 below.

3.2 Criteria for national amateur radio novice examination

The national amateur radio novice examination should cover the subjects that a radio amateur may encounter in conducting tests with an amateur station and with its operation, and shall include at least:

Technical, operational and regulatory matters
(see the Novice Examination syllabus annex 2)

- a) TECHNICAL CONTENT
 - 1. Electrical, Electro-Magnetic and Radio Theory
 - 2. Components
 - 3. Circuits
 - 4. Receivers
 - 5. Transmitters
 - 6. Antennas and Transmission Lines
 - 7. Frequency spectrum and propagation
 - 8. Measurements
 - 9. Interference and Immunity
 - 10. Safety

- b) NATIONAL AND INTERNATIONAL OPERATING RULES AND PROCEDURES
 - 1. Phonetic Alphabet
 - 2. Q-code (as far as radio amateur traffic is concerned)
 - 3. Operational Abbreviations
 - 4. Call signs
 - 5. Operating competences

- c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR RADIO AND AMATEUR RADIO SATELLITE SERVICE
 - 1. ITU Radio Regulations
 - 2. CEPT Regulations
 - 3. National laws, regulations and licence conditions

3.3 The Amateur Radio Novice Examination Certificate

The Amateur Radio Novice Examination Certificate should contain at least the following information in the language of the country of issue as well as in English, French and German:

- a) a statement to the effect that the holder has passed an examination, meeting the requirements for a CEPT novice examination level certificate
- b) the holder's name and date of birth
- d) the date of issue
- e) the issuing authority

This document may take the form as set out in Annex 1.

ANNEX 1

AMATEUR RADIO NOVICE EXAMINATION CERTIFICATE

1. The issuing Administration or responsible issuing Authority _____ of the country _____ declares herewith that the holder of this certificate has successfully passed an amateur radio novice examination which fulfils the requirements laid down by the International Telecommunications Union (ITU). The passed examination corresponds to the examination described in ERC Report 32.
2. L'Administration ou l'Autorité compétente _____ du pays _____ certifie que le titulaire du présent certificat a réussi un examen de radioamateur conformément au règlement de l'Union Internationale des Télécommunications (UIT). L'épreuve en question correspond à l'examen décrit dans le rapport "ERC Report 32"
3. Die ausstellende Verwaltung oder zuständige Behörden _____ des Landes _____ erklärt hiermit, daß der Inhaber dieser Bescheinigung eine Amateurfunkprüfung erfolgreich abgelegt hat, welche den Erfordernissen entspricht, wie sie von der Internationalen Fernmeldeunion (ITU) festgelegt sind. Die abgelegte Prüfung entspricht der im ERC Report 32 beschriebenen Prüfung.
4. Officials requiring information about this certificate should address their enquiries to the issuing national Authority or the issuing Administration as indicated above.
5. Les autorités officielles désirant des informations sur ce document devront adresser leurs demandes à l'Autorité nationale compétente mentionnée ci-dessous.
6. Behörden, die Auskünfte über diese Bescheinigung erhalten möchten, sollten ihre Anfragen an die genannte ausstellende nationale Behörde oder die ausstellende Verwaltung richten.
7. Address/Adresse/Anschrift

Telephone/Téléphone/Telefon: _____

Telex/Téléx/Telex: _____

Telefax/Téléfax/Telefax: _____

Signature
Signature
Unterschrift

Official stamp
Cachet officiel
Offizieller Stempel

ANNEX 2

EXAMINATION SYLLABUS FOR AMATEUR RADIO NOVICE EXAMINATION LEVEL

INTRODUCTION

This syllabus has been produced for the **guidance** of administrations so that they may prepare their national amateur radio examinations for the amateur radio novice examination Certificate.

The purpose of the examination is to set a reasonable (or sufficient) level of starting (or intermediate) knowledge required for candidate radio amateurs wishing to obtain a license for operating in a limited way on amateur stations.

The scope of the examination is limited to subjects relevant to tests and experiments with amateur stations conducted by radio amateurs. These include circuits and their diagrams; questions may relate to circuits using both integrated circuits and discrete components.

- a) Where *quantities* are referred to, candidates should know the *units* in which these quantities are expressed, as well as the generally used multiples and sub-multiples of these units.
- b) Candidates must be familiar with the compound of the symbols.
- c) Candidates must know the following mathematical concepts and operations:
 - adding, subtracting, multiplying and dividing;
 - fractions;
 - squaring;
 - square roots.
- d) Candidates must be familiar with the formulae used in this syllabus and be able to transpose them.

SYLLABUS STRUCTURE

- a) **TECHNICAL CONTENT**
 1. ELECTRICAL, ELECTRO-MAGNETIC AND RADIO THEORY
 - 1.1 Conductivity
 - 1.2 Sources (of electricity)
 - 1.3 Radio Waves
 - 1.4 Audio and digital signals
 - 1.5 Modulated signals
 - 1.6 Power
 2. COMPONENTS
 - 2.1 Resistor
 - 2.2 Capacitor
 - 2.3 Coil
 - 2.4 Transformers application and use
 - 2.5 Diode
 - 2.6 Transistor
 - 2.7 Tuned circuits
 3. CIRCUITS
 - 3.1 Filters
 4. RECEIVERS
 - 4.1 Types
 - 4.2 Block diagrams
 - 4.3 Operation and function

5. TRANSMITTERS
 - 5.1 Block diagrams
 - 5.2 Operation and functions
 - 5.3 Transmitter characteristics
 6. ANTENNAS AND TRANSMISSION LINES
 - 6.1 Antenna types (physical construction, directional properties and polarisation only)
 - 6.2 Methods of feeding antenna
 - 6.3 Matching
 7. FREQUENCY SPECTRUM AND PROPAGATION
 8. MEASUREMENTS
 - 8.1 Making measurements
 - 8.2 Measuring instruments
 9. INTERFERENCE AND IMMUNITY
 - 9.1 Interference in electronic equipment
 - 9.2 Cause of interference in electronic equipment
 - 9.3 Measures against interference
 10. SAFETY
 - 10.1 The human body
 - 10.2 Mains power supply
 - 10.3 Dangers
 - 10.4 Lightning
- b) NATIONAL AND INTERNATIONAL OPERATING RULES AND PROCEDURES
1. Phonetic alphabet
 2. Q-Code
 3. Operational Abbreviations as used in the Amateur Service
 4. Call signs
 5. Operating competences
- c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR RADIO AND AMATEUR RADIO SATELLITE SERVICE
1. ITU Radio Regulations
 2. CEPT Regulations
 3. National laws, Regulations and Licence Conditions

SYLLABUS IN DETAIL

a) TECHNICAL CONTENT

CHAPTER 1

1. ELECTRICAL, ELECTRO-MAGNETIC AND RADIO THEORY

1.1 Conductivity

- Conductor, semiconductor and insulator.
- Current, voltage and resistance.
- The units ampere, volt and ohm.
- Ohm's Law ($E=I.R$).
- Electric power ($P=E.I$).
- The unit watt.

1.2 Sources (of electricity)

- Battery and mains.

1.3 Radio Waves

- Radio waves as electromagnetic waves.
- Propagation velocity and its relation with frequency and wavelength ($n = f \times \lambda$)
- Polarisation.
- Frequency.
- The unit hertz.

1.4 Audio and digital signals

- Audio signals.
- Digital signal,

1.5 Modulated signals

Advantages and disadvantages of:

- Amplitude modulation.
- Single-sideband modulation.
- Frequency modulation.
- Carrier, sidebands and bandwidth.

1.6 Power

- DC-input power and RF-output power.

CHAPTER 2

2. COMPONENTS

2.1 Resistor

- Resistance.
- The unit ohm.
- Power dissipation.
- Colour code.
- Resistors in series and parallel.

2.2 Capacitor

- Capacitance.
- The unit farad.
- Use of fixed and variable capacitors: air, mica, plastic, ceramic and electrolytic capacitors.
- Capacitors in parallel.

2.3 Coil

- The unit henry.

2.4 Transformers application and use

- Transformers (application).

2.5 Diode

- Use and application of diodes: rectifier diode, zener diode.

2.6 Transistor

- Know that a transistor can be used as amplifier or oscillator.

CHAPTER 3

3. CIRCUITS

3.1 Filters

- Low-pass, high-pass, band-pass and band-stop filters use and application only. Series-tuned and parallel-tuned circuits (functions only).

CHAPTER 4

4. RECEIVERS

4.1 Types

- Single superheterodyne receiver.
- Straight or t.r.f receivers.

4.2 Block diagrams

- CW receiver (A1A).
- AM receiver (A3E).
- SSB receiver (J3E).
- FM receiver (F3E).

4.3 Operation and function of the following stages (Block diagram treatment only)

- HF amplifier.
- Oscillator (fixed and variable).
- Mixer.
- Intermediate frequency amplifier.
- Detector.
- Beat frequency oscillator (BFO).
- LF amplifier.
- Power supply.
- Squelch (purpose only).

CHAPTER 5

5. TRANSMITTERS

5.1 Block diagrams

- CW transmitter (A1A).
- SSB transmitter (J3E).
- FM transmitter (F3E).

5.2 Operation and functions of the following stages (Block diagram treatment only)

- Mixer.
- Oscillator (crystal and VFO).
- Buffer.
- Driver.
- Frequency multiplier.
- Power amplifier.
- Output filter (pi-filter).
- Frequency modulator.
- SSB modulator.
- Power supply.

5.3 Transmitter characteristics (simple description)

- Frequency stability.
- RF-bandwidth.
- Sidebands.
- Output power.
- Spurious, harmonics.

CHAPTER 6

6. ANTENNAS AND TRANSMISSION LINES

6.1 Antenna types (physical construction, directional properties and polarisation only)

- Centre fed half-wave antenna.
- End fed antenna.
- Quarter-wave vertical antenna (ground plane).
- Antenna with parasitic elements (Yagi).
- Radiated power [ERP, EIRP]

6.2 Methods of feeding antenna

- Coaxial cable and twin feeder:
- Advantages and disadvantages;
- Construction and use.

6.3 Matching

- Antenna tuning units (purpose only).

CHAPTER 7

7. FREQUENCY SPECTRUM AND PROPAGATION (simple description only)

- Ionospheric layers.
- The effect of the ionospheric layers on HF propagation.
- Fading.
- Troposphere.
- The effect of the weather conditions on VHF/UHF propagation.
- Sunspot cycle and effect on communication.
- HF, VHF, UHF ranges.

CHAPTER 8

8. MEASUREMENTS

8.1 Making measurements

Measurement of:

- DC and AC voltage.
- DC and AC current.
- Resistance.
- DC and RF power.
- Frequency.

8.2 Measuring instruments

Making measurements using:

- Multi-range meter (digital and analog).
- Standing Wave Ratio meter.
- Absorption wavemeter.
- Dummy load.

CHAPTER 9

9. INTERFERENCE AND IMMUNITY

9.1 Interference in electronic equipment

- Interference with the desired signal TV, VHF and broadcasting.
- Interference with audio systems.

9.2 Cause of interference in electronic equipment

- Spurious radiation of the transmitter (parasitic radiation, harmonics).
- Undesired influence on the equipment:
 - via the receiver antenna input;
 - via other routes (mains, speaker and connecting leads);
 - by direct radiation.

9.3 Measures against interference

Measures to prevent and minimise interference:

- Filtering at the amateur station.
- Filtering at the interfered apparatus.
- Decoupling.
- Shielding.
- Separation of transmitting and TV antennas.
- Avoid use of end-fed antenna.
- Minimum power.
- Good RF earth.
- Social effects (good relation with neighbours).

CHAPTER 10

10. SAFETY

10.1 The human body

- The consequences of electrical shock.
- Precaution against electrical shock.

10.2 Mains power supply

- Difference between line, neutral and earth (colour code).
- Importance of good ground connections.
- Quick and slow fuses, values of fuses.

10.3 Dangers

- High voltages.
- Charged capacitors.

10.4 Lightning

- Danger.
- Protection.
- Grounding of equipment.

b) NATIONAL AND INTERNATIONAL OPERATING RULES AND PROCEDURES

CHAPTER 1

1. PHONETIC ALPHABET

| | | |
|-------------|--------------|-------------|
| A = Alpha | J = Juliet | S = Sierra |
| B = Bravo | K = Kilo | T = Tango |
| C = Charlie | L = Lima | U = Uniform |
| D = Delta | M = Mike | V = Victor |
| E = Echo | N = November | W = Whiskey |
| F = Foxtrot | O = Oscar | X = X-ray |
| G = Golf | P = Papa | Y = Yankee |
| H = Hotel | Q = Quebec | Z = Zulu |
| I = India | R = Romeo | |

CHAPTER 2

2. Q-CODE

| <i>Code</i> | <i>Question</i> | <i>Answer</i> |
|-------------|---|---|
| QRK | What is the readability of my signals? | The readability of your signals is ... |
| QRM | Are you being interfered with? | I am being interfered with |
| QRN | Are you troubled by static? | I am troubled by static |
| QRO | Shall I increase transmitter power? | Increase transmitter power |
| QRP | Shall I decrease transmitter power? | Decrease transmitter power |
| QRS | Shall I send more slowly? | Send more slowly |
| QRT | Shall I stop sending? | Stop sending |
| QRZ | Who is calling me? | You are being called by ... |
| QRV | Are you ready? | I am ready |
| QSB | Are my signals fading? | Your signals are fading. |
| QSL | Can you acknowledge receipt? | I am acknowledging receipt. |
| QSO | Can you communicate with ... direct? | I can communicate ... direct |
| QSY | Shall I change to transmission on another frequency? | Change transmission to another frequency. |
| QRX | When will you call again? | I will call you again at ... hours on ... kHz (or MHz) |
| QTH | What is your position in latitude and longitude (or according to any other indication)? | My position is ... latitude, ... longitude (or according to any other indication) |

CHAPTER 3

3. OPERATIONAL ABBREVIATIONS AS USED IN THE AMATEUR SERVICE

| | |
|-----|---|
| BK | Signal used to interrupt a transmission in progress |
| CQ | General call to all stations |
| CW | Continuous wave |
| DE | From, used to separate the call sign of the station called from that of the calling station |
| K | Invitation to transmit |
| MSG | Message |
| PSE | Please |
| R | Received |
| RX | Receiver |
| TX | Transmitter |
| UR | Your |

CHAPTER 4

4. CALL SIGNS

- Identification of the amateur station.
- Use of the call signs
- Composition of call signs.
- National prefixes

CHAPTER 5

5. OPERATING COMPETENCES

- Starting, carrying out and ending a contact
- Correct use of call signs and abbreviations
- Content of transmissions
- Checking transmission quality
- The Radio Amateur Code of Conduct and self-discipline

c) NATIONAL AND INTERNATIONAL REGULATIONS RELEVANT TO THE AMATEUR RADIO AND AMATEUR RADIO SATELLITE SERVICE

CHAPTER 1

1. ITU RADIO REGULATIONS

- Definition Amateur Service and Amateur Satellite Service
- Definition Amateur station
- Article 25 Radio Regulations
- Status Amateur Service and Amateur Satellite Service
- ITU Radio Regions

CHAPTER 2

2. CEPT REGULATIONS

- ECC Recommendation (05)06
- Temporary use of amateur stations in CEPT countries
- Temporary use of amateur stations in non-CEPT countries which participate in the CEPT Novice Radio Amateur Licensing system

CHAPTER 3

3. NATIONAL LAWS, REGULATIONS AND LICENCE CONDITIONS

- National laws.
- Regulations and licence conditions.
- Frequency bands allocated to the amateur service and amateur satellite service
- Demonstrate knowledge of maintaining a log.
- Log keeping.
- Purpose.
- Recorded data.