



Amateur Radio Licence Exam

In Accordance with ECC/REC/T/R 61-02 HAREC Standard

60 Questions—Duration Two Hours

Sample Paper

Please read the following notes BEFORE you answer any questions:

1. FOUR possible answers are shown for each question: ‘A’, ‘B’, ‘C’, and ‘D’. No answer is more correct than another answer. Only ONE is correct and the remaining three are incorrect. Decide which one is correct and mark your answer by ticking the appropriate box on the answer sheet.
2. There may be other possible answers to the questions than those shown in this paper, however, a choice of an answer from those given is required.
3. You may only tick ONE BOX to indicate ‘A’, ‘B’, ‘C’, or ‘D’ as your answer.
4. If you make a mistake or change your mind having ticked one of the boxes, then clearly shade out the box you initially ticked, and tick the box indicating the answer you wish to give:

This box is ticked, meaning *this is my answer*: [✓] or [/] or [x]

This box is shaded, meaning *I have changed my mind, this is not my answer*: [■]

5. Remember: it is vitally important that your answer sheet shows unambiguously which ONE answer you have selected and/or if you have cancelled an answer by shading out a box. If there is any ambiguity, for example, if it is not clear which ONE box has been ticked then the answer will be disallowed.
6. Any calculations or rough work can be done on the question sheet or on the “Calculations & Comments” page at the end of the paper. You may need a calculator to answer some of the questions—a suitable non-programmable calculator has been provided.
7. You should attempt all questions. Please note that ‘negative marking’ is not used in this exam. If you find a question difficult, leave it and return to it later.
8. The paper, with your answers, must be handed in at the end of the exam. The paper cannot be removed from the exam centre even if you decide not to proceed with the exam.
9. The pass mark is **60%** and a pass is required in EACH of the two main sections of the paper: Section A and Section B.



10. If you have any comments on the exam or the questions, please include them in the 'Calculations & Comments' section at the end of the paper.
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Please put your details here:

Name (PRINT)	
Exam Paper Number	
Exam Venue	
Exam Date	
Your Signature	



Section A: Technical

A.1 Safety (5 Questions)

1. A mains plug for a power supply which has a power consumption of 500 W should have a fuse rated at _____ to provide the highest possible level of protection. Bear in mind that the nominal mains voltage in Ireland is 230 V.

A [] 3 A
B [] 5 A
C [] 13 A
D [] 16 A

2. Your transmitter power is 100 W Peak Envelope Power (PEP). You are using a quarter-wave vertical antenna. Which of these conditions is likely to help keep the magnetic and electric fields strengths within the ICNIRP limits?

A [] Using a linear amplifier
B [] Positioning the antenna so that the affected people are in the reactive near field
C [] Positioning the antenna so that the affected people are in the radiating far field
D [] Using a low-loss coaxial transmission line

3. When installing a resonant half-wave dipole, which is the more important consideration to keep high voltages away from possible human contact?

A [] The location of the ends of the dipole
B [] The location of the centre of the dipole
C [] The location of the low-pass filter
D [] All are equally important; the voltages are the same at all points



Section A: Technical

4. If a guy rope is used to help support a mast it should be:
- A [] Of a non-resonant length
 - B [] Secured to the ground more than 60% of the mast height away from the base of the mast
 - C [] Secured to the ground less than 60% of the mast height away from the base of the mast
 - D [] Secured in such a way as to ensure the mast falls away from other structures should the rope fail
5. What is the most important factor to consider to ensure that the level of non-ionising radiation from an amateur radio station is within the ICNIRP guideline limits for public exposure?
- A [] The design of the output stages of the final amplifier
 - B [] Filtering at the output stages
 - C [] The design and location of the antenna
 - D [] Minimising parasitic oscillations



Section A: Technical

A.2 Interference and Immunity (4 Questions)

6. Every time you transmit you notice that your computer is malfunctioning. Which action is unlikely to reduce this type of interference?
- A [] Fit an appropriate balun or unun acting as a common mode choke
 - B [] Ensure that all equipment is connected to a good earth
 - C [] Use a low-pass filter
 - D [] Fit clamp-on ferrite rings on cables connected to the computer and its devices
7. Intermodulation in a receiver is more likely to be caused by:
- A [] The mixing of two or more frequencies in some part of the receiver circuitry
 - B [] Lack of sensitivity
 - C [] Absence of mains filtering
 - D [] Excessively low SWR on the antenna feed line
8. A band-pass filter:
- A [] Passes signals at all frequencies
 - B [] Attenuates signals at all frequencies
 - C [] Passes signals between two frequencies
 - D [] Increases the receiver bandwidth



Section A: Technical

9. A neighbour's hi-fi system is suffering radio frequency break-through. A remedy for this might be to:
- A [] Place a capacitor in series with the transmitter output
 - B [] Put ferrite rings on the hi-fi system's loudspeaker cables
 - C [] Place a ferrite ring on the transmitter output cable
 - D [] Use open wire feeder for the transmitter

A.3 Electrical, Electro-magnetic, and Radio Theory (4 Questions)
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10. If the current is 10 A, what would be the power dissipated in a component whose resistance is 5 Ω ?
- A [] 2 W
 - B [] 20 W
 - C [] 50 W
 - D [] 500 W
11. Alternating current will lead the voltage in:
- A [] An inductive circuit
 - B [] A resonant circuit
 - C [] A capacitive circuit
 - D [] An open circuit



Section A: Technical

12. What can be used to convert a digital signal representation from the time domain to the frequency domain?

- A [] Quartz crystal
- B [] Fast Fourier Transform (FFT)
- C [] Variable Frequency Oscillator (VFO)
- D [] Band Pass Filter

13. You are looking at a spectrogram of an amateur radio transmission. You notice that most of the power lies in the range of frequencies approximately 2.7 kHz higher than that of the carrier wave frequency. Which modulation technique was most likely used in this case?

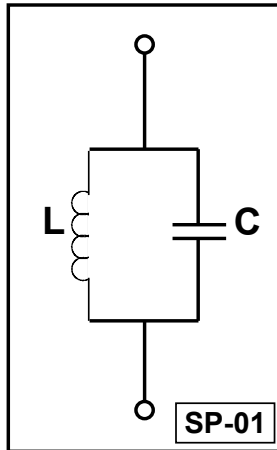
- A [] AM
- B [] CW
- C [] LSB
- D [] USB



Section A: Technical

A.4 Components and Circuits (3 Questions)

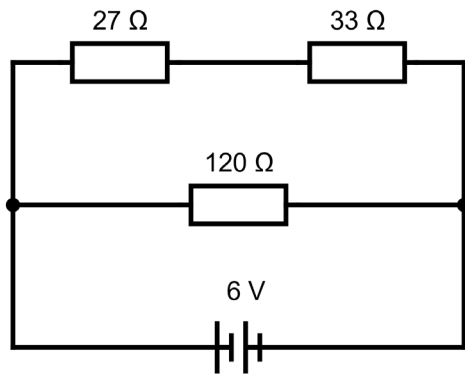
14. In the circuit below, ignoring component losses:



- A [] Current at the resonant frequency and below that frequency will be unaffected
- B [] Current at the resonant frequency will be impeded
- C [] Current at the resonant frequency will readily pass through
- D [] Current at the resonant frequency and above that frequency will be unaffected

Section A: Technical

15. The current flowing through the $27\ \Omega$ resistor in the circuit below is:



A [] 27 mA

B [] 33 mA

C [] 60 mA

D [] 100 mA

16. An RF output stage has a power gain of 10 dB. What is the power input required to obtain 20 Watts of output power?

A [] 1 W

B [] 100 mW

C [] 2 W

D [] 200 mW

A.5 Transmitters and Receivers (4 Questions)

17. All other things being equal, SSB transmissions:

A [] Occupy about twice the bandwidth of AM transmissions

B [] Contain more information than AM transmissions

C [] Occupy the same bandwidth as CW transmissions

D [] Occupy about half the bandwidth of AM transmissions

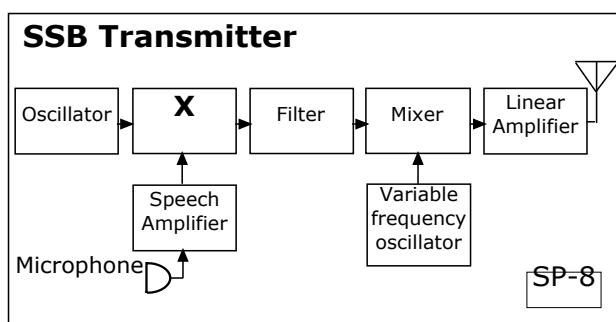


Section A: Technical

18. The sensitivity of a receiver refers to:

- A [] The bandwidth of the RF preamplifier
- B [] The stability of the oscillator
- C [] Its ability to receive weak signals
- D [] Its ability to reject strong signals

19. The block diagram below shows an SSB transmitter. What is the component marked “X” most likely to be?



- A [] SWR meter
- B [] Balanced modulator
- C [] Low pass filter
- D [] Frequency multiplier

20. The total bandwidth of an FM audio transmission is equivalent to:

- A [] Twice the highest audio frequency
- B [] Twice the sum of the peak deviation frequency and the highest audio frequency
- C [] The peak deviation frequency
- D [] Twice the peak deviation frequency



Section A: Technical

A.6 Antennas and Transmission Lines (4 Questions)

21. The characteristic impedance of coaxial cable typically used as an antenna feeder could be:

A [] $< 1 \Omega$

B [] 50Ω

C [] 600Ω

D [] $1 \text{ k}\Omega$

22. If an antenna feeder must pass near conductive objects the following type of feed line should be used:

A [] Narrow-spaced open wire

B [] Wide-spaced open wire

C [] Twisted lead

D [] Coaxial cable

23. The ERP of an antenna is:

A [] Directly proportional to the antenna's gain

B [] A measurement of the antenna's front-to-back ratio

C [] Affected only by the antenna's height above RF ground

D [] The Estimated Reflected Power of the antenna



Section A: Technical

- 24.** What is the purpose of an Antenna Tuning Unit (ATU) connected between the transmission line and the antenna feed point?
- A [] To select the desired frequency on the transceiver
 - B [] To match the impedance of the transmission line to that of the antenna at the desired frequency
 - C [] To match the impedance of the transceiver to that of the transmission line at the desired frequency
 - D [] To stop common mode currents

A.7 Propagation (4 Questions)

- 25.** The 160 metre band is not usually used for long-distance communication during daylight hours because:
- A [] The Sun ionises the F-layer
 - B [] The signal is absorbed by the D-layer (or “D region”)
 - C [] The signal is absorbed by the E-layer
 - D [] The signal is absorbed by the F-layer
- 26.** The factor least likely to affect the single hop skywave skip distance of a HF transmission is the:
- A [] Frequency of the transmission
 - B [] Mode of transmission
 - C [] Angle of radiation
 - D [] Height of the ionospheric layer reflecting the transmission



Section A: Technical

27. Two amateur radio stations that are four kilometres apart and separated by a low hill blocking their line-of-sight path are communicating on the 160 metre band. What type of propagation is probably being used?
- A [] Ground wave
B [] Tropospheric ducting
C [] Ionospheric propagation
D [] Sporadic E
28. The highest frequency above which a radio signal directed vertically upwards is not returned to ground is called:
- A [] The critical frequency
B [] The maximum usable frequency
C [] The optimum traffic frequency
D [] The standard frequency

A.8 Measurements (2 Questions)

29. An oscilloscope is being used to analyse the output signals from a transmitter. The y-axis (vertical axis) will represent:
- A [] The signal frequency
B [] The audio frequency
C [] The intermediate frequency
D [] The signal voltage



Section A: Technical

30. The RMS value of a 10 V peak sine wave is:

A [] 5 V

B [] 11.1 V

C [] 7.07 V

D [] 15 V



Section B: Operating Rules, Procedures, and Regulations

B.1 Phonetic Alphabet (1 Question)

31. The call sign NK6GR in the phonetic alphabet would be correctly spoken as:

- A [] November-Kilo-Six-Golf-Romeo
- B [] November-Kilowatt-Six-George-Radio
- C [] Nancy-Kilowatt-Six-Golf-Romeo
- D [] November-Kilo-Six-George-Romeo

B.2 Q-Codes (3 Questions)

32. A station's location or position is normally abbreviated using which Q-Code?

- A [] QFH
- B [] QFE
- C [] QLF
- D [] QTH

33. What does the code QRZ? mean?

- A [] Are you operating on low power?
- B [] Who is calling me?
- C [] Are my signals fading?
- D [] Can you change frequency?



Section B: Operating Rules, Procedures, and Regulations

- 34.** The station that you are communicating with informs you that your signal is affected by QSB. What does it mean?
- A [] Your audio is distorted and over-modulated
 - B [] The other station intends to change frequency
 - C [] There is static on your signal
 - D [] Your signals are fading

<h3>B.3 International Distress Signs, Emergency Traffic, and Natural Disaster Communications (3 Questions)</h3>

- 35.** The international radiotelephony (voice) distress signal to indicate a life-threatening emergency is:
- A [] Help
 - B [] CQ DX
 - C [] Mayday
 - D [] SOS
- 36.** The Irish Emergency Communications Centre of Activity frequency on the 80 m band is:
- A [] 7.115 MHz
 - B [] 3.660 MHz
 - C [] 3.630 MHz
 - D [] 3.760 MHz



Section B: Operating Rules, Procedures, and Regulations

37. Transmitting on an emergency centre of activity frequency is:

- A Never allowed
- B Allowed only in an emergency
- C Permitted, provided that it is not in use and there is no well-publicised emergency in progress
- D Always permitted without having to take any precautions

B.4 Call Signs (3 Questions)

38. The call sign of a radio amateur in the Czech Republic might have the prefix:

- A CZ
- B CK
- C OK
- D CR0

39. The call sign of a radio amateur operating from an Irish offshore island might be:

- A EJ/EI3PA
- B EJ3PA
- C EI3PA/MM
- D EI3PA/EJ



Section B: Operating Rules, Procedures, and Regulations

40. Which of these call signs complies with the ITU Radio Regulations for a normal amateur radio call sign?

- A [] EJ6
- B [] 6EGJ
- C [] 2E6J
- D [] 2EJ6

B.5 Radio Spectrum Allocation in Ireland and IARU Band Plans (4 Questions)
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41. To comply with the IARU Region 1 Band Plan and the Irish regulations, the lowest dial setting for LSB (voice) transmissions on the 1.8 MHz band should be:

- A [] 1840 kHz
- B [] 1843 kHz
- C [] 1853 kHz
- D [] 1903 kHz

42. Under the IARU Region 1 Band Plan, which mode(s) may be used in the frequency range 3.510–3.570 MHz:

- A [] All modes
- B [] CW
- C [] CW and Digimodes
- D [] SSB (however, no contests)



Section B: Operating Rules, Procedures, and Regulations

43. Which one of these frequency ranges has a secondary status of allocation to radio amateur use?
- A [] 18.068 to 18.168 MHz
 - B [] 21.000 to 21.450 MHz
 - C [] 50.000 to 52.000 MHz
 - D [] 144.000 to 146.000 MHz
44. The authorised frequency range in the 40 metre band is:
- A [] 7.000 to 7.100 MHz
 - B [] 7.000 to 7.200 MHz
 - C [] 7.000 to 7.268 MHz
 - D [] 7.000 to 7.300 MHz

B.6 Social Responsibility of Radio Amateur Operation and the Code of Conduct (3 Questions)
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45. While attempting to make a contact with a rare DX station during a “pile up” i.e., when many others are also attempting to contact that station, a radio operator should:
- A [] Call at the same time as the other stations letting the DX station decide which operator to reply to
 - B [] Transmit the operator’s call sign just before the DX station has finished communication with another station
 - C [] Transmit a constant carrier wave to reserve the frequency
 - D [] Wait until the DX station asks for replies to their CQ calls



Section B: Operating Rules, Procedures, and Regulations

46. Your call sign is EI5XYZ. You have just tuned to a new frequency. What is the correct sequence of actions when calling CQ?
- A [] Call “CQ from EI5XYZ”; listen if anyone reports that the frequency is in use; call again “CQ from EI5XYZ” if appropriate
 - B [] Listen to check if the frequency is clear; call “Is this frequency in use, this is EI5XYZ”; listen; if no response, call “CQ from EI5XYZ”
 - C [] Listen to check if the frequency is clear; call “Is this frequency in use”; listen; if no response, call “CQ from EI5XYZ”
 - D [] Call “CQ from EI5XYZ, is this frequency in use”; listen if anyone reports that the frequency is in use; call again “CQ from EI5XYZ” if appropriate
47. How often should you identify yourself by giving your call sign during a contact established from a land based fixed station?
- A [] You must identify yourself every time you transmit
 - B [] You should identify yourself only at the beginning and the end of the contact
 - C [] You should identify yourself at the beginning and at the end of the contact, and frequently at short intervals
 - D [] You should identify yourself at the beginning and at the end of the contact or at intervals of 30 minutes, whichever is more frequent



Section B: Operating Rules, Procedures, and Regulations

B.7 Operating Procedures and Non-Interference (5 Questions)

- 48.** An RS signal report of “35” would mean:
- A Unreadable, 3 on the S meter
 - B Strong signal, 3 on the S meter
 - C Perfectly readable, 3 on the S meter
 - D Readable with considerable difficulty, 5 on the S meter
- 49.** What is the correct way to make a voice (phone) general call to a station in Japan?
- A CQ CQ CQ from EI5ABC EI5ABC EI5ABC standing by
 - B CQ Japan CQ Japan CQ Japan from EI5ABC EI5ABC EI5ABC standing by
 - C CQ DX Japan CQ DX Japan CQ DX Japan from EI5ABC EI5ABC EI5ABC standing by
 - D CQ DX CQ DX CQ DX from EI5ABC EI5ABC EI5ABC standing by
- 50.** The Morse Code message “CQ CQ CQ DE EI3XYZ <AR>” indicates that:
- A EI3XYZ has put out a general call for a contact
 - B Someone is calling EI3XYZ
 - C EI3XYZ is giving a signal report
 - D EI3XYZ is making a test transmission and should not be answered



Section B: Operating Rules, Procedures, and Regulations

- 51.** You are regularly experiencing on-air interference from an unknown source that you suspect might be abroad. What is the recommended approach towards reporting it?
- A Report it to An Garda Síochána (police)
 - B Report it to ComReg
 - C Report it to IARU IARUMS R1 via the IRTS IARU Liaison Officer
 - D Try to resolve it by talking to the interfering party directly
- 52.** The call sign suffix /QRP:
- A Should be used when operating portable
 - B Should only be used during contests
 - C Is only legal when using less than 5 W on CW or 10 W on SSB
 - D Is bad practice and illegal in many countries

B.8 ITU Radio Regulations (2 Questions)

- 53.** According to ITU Regulations, radiocommunications between amateur stations of two different countries is permitted:
- A Only when a reciprocal agreement permitting such transmissions is in place between the two countries
 - B Unless the administration of one of the countries concerned has notified that it objects to such radiocommunications
 - C If the two countries are members of the IARU
 - D If the two countries are members of the ITU



Section B: Operating Rules, Procedures, and Regulations

54. J3E is the ITU emission designation for:

- A [] Single sideband, suppressed carrier, speech
- B [] RTTY / AMTOR
- C [] CW (Morse)
- D [] Frequency modulation

B.9 CEPT Regulations (3 Questions)

55. A CEPT amateur radio licence entitles the holder to:

- A [] Broadcast on the amateur radio frequency bands
- B [] Broadcast to the general public, subject to the frequency and power limits specified in the licence
- C [] Establish communications on amateur radio frequencies with other amateur radio stations
- D [] Establish communications with anyone on the amateur radio frequency bands

56. The call sign M/EI8XYZ would be used by:

- A [] An English visitor to Ireland who has been issued with a visitor's call sign
- B [] The holder of EI8XYZ while on a visit to England
- C [] The holder of EI8XYZ while operating mobile in Ireland
- D [] The holder of EI8XYZ while operating mobile in Northern Ireland



Section B: Operating Rules, Procedures, and Regulations

- 57.** A holder of an Irish CEPT Amateur Radio Licence can operate in another country that is listed in the CEPT T/R 61-01 Annexes 2 or 4 for stays up to ___ without having to obtain a licence issued in that country:
- A [] A period varying from 1 to 3 months or 90 days depending on the country
 - B [] Up to 180 days or 6 months in all CEPT countries
 - C [] Up to 365 days or 1 year in all CEPT countries
 - D [] Any reasonable duration of a visit, provided the operator does not intend to reside in the visited country on a permanent basis

B.10 Irish Laws, Regulations, and Licence Conditions (3 Questions)
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- 58.** Each entry recorded in the station's logbook must include:
- A [] Power level used
 - B [] Details of the antenna used
 - C [] Location of stations contacted
 - D [] Signal reports sent and received
- 59.** The maximum power permitted when operating from a land-based vehicle on 70.200 MHz is:
- A [] 200 W (23 dBW)
 - B [] 100 W (20 dBW)
 - C [] 50 W (17 dBW)
 - D [] 25 W (14 dBW)



Section B: Operating Rules, Procedures, and Regulations

60. Which of the following statements about CEPT Amateur Radio Licences issued in Ireland is incorrect:

- A [] ComReg can revoke a licence if there is a serious or repeated non-compliance by the licensee with the conditions of the licence
- B [] A licence is valid for the lifetime of the licensee as long as its details, such as the station address, remain correct
- C [] A licence is valid for 5 years
- D [] Licensees must confirm with ComReg their details, such as their address and contact details, every 5 years



Calculations & Comments

Use the space below for your calculations or comments

This page does not count for the exam results



Answers

Question Number	Answer
1	A
2	C
3	A
4	B
5	C
6	C
7	A
8	C
9	B
10	D
11	C
12	B
13	D
14	B
15	D
16	C
17	D
18	C
19	B
20	B
21	B
22	D
23	A
24	B
25	B
26	B
27	A
28	A
29	D
30	C

Question Number	Answer
31	A
32	D
33	B
34	D
35	C
36	B
37	C
38	C
39	B
40	C
41	C
42	B
43	C
44	B
45	D
46	B
47	C
48	D
49	B
50	A
51	C
52	D
53	B
54	A
55	C
56	B
57	A
58	A
59	D
60	C

