

A sample Examination Paper:

[A sample candidate's Answer Sheet is here on page 11]

The Amateur Radio Examination

This is Question Paper Code: **[Example 1.1 — CANDIDATE'S COPY]**

Source: Developed by Approved Radio Examiner ARX2106

Please read these instructions

Do not open the question paper to commence the examination until signalled by an Examination Supervisor.

Before the Examination

You will have been issued with a combined answer sheet and record form (*check BOTH sides*). Please complete all the information requested. All details are required. Please PRINT legibly. If you have any queries please consult your Supervisors.

Examination Instructions

1. The time limit for this examination is two hours. You may not need the full time. You may leave the examination room at any time.
2. This examination has 60 questions. Answer all 60 using the answer sheet provided.
A pass requires 40 or more correct answers.
3. Each question has four optional answers. Only **one** will be correct.
4. Answer each question by drawing a **clear circle** around the letter option on the answer sheet that you think is correct.
5. If you wish to change your answer, **draw a line through each of the four options** and write the letter designating your new answer in a remaining space.

This printed **examination question paper** is yours to retain if you wish. Your answer sheet remains the property of *the ARX administering the examination* and is retained for audit purposes in those records.

If you have any complaint about this examination or the examination procedure, you should first write accordingly to the ARX administering the examination.

Please ignore the last numeral in each of the following question numbers (it is for source reference purposes only).

01-4

The world is divided into radio regulatory regions each with different radio spectrum allocations. New Zealand is in:

- a Region 1
- b Region 2
- c Region 3
- d Region 4

02-1

As the holder of a General Amateur Operator Certificate of Competency you may operate transmitters in your station:

- a any number at one time
- b only one at any time except in emergencies
- c one at a time
- d any number but must be on different bands

03-6

Repeater equipment and frequencies used by New Zealand radio amateurs are co-ordinated by:

- a a panel of repeater trustees
- b the MBIE RSM
- c representatives from affected radio clubs
- d the NZART Frequency Management and Technical Advisory Group.

04-3

The transmitter output power for amateur stations at all times is:

- a set by the level required for interference-free local television viewing
- b the minimum power necessary to communicate and within the terms of the amateur radio GURL
- c reduced by 20dB when installed on a motor vehicle
- d set to a low level for newly-qualified operators

05-0

A person in distress:

- a must avoid passing third-party traffic
- b should use only the approved distress channels
- c may use any available communication means to attract attention
- d should quote the GPS coordinates of the current position

06-2

If you receive distress traffic and are unable to render assistance, you should:

- a log the circumstances and close down
- b continue with what you were doing
- c maintain watch until you are certain that assistance is forthcoming
- d take no action

07-9

A General Amateur Operator Certificate of Competency:

- a has a limited life-time
- b does not confer on its holder a monopoly on the use of any frequency or band
- c is transferable to your descendants
- d provides a waiver over copyright

08-8

The frequency limits of the "70 centimetre band" are:

- a 430 to 438 MHz
- b 430 to 450 MHz
- c 435 to 438 MHz
- d 430 to 440 MHz

09-1

Amateur satellites may operate on these two bands:

- a 21.0 to 21.1 MHz and 146.0 to 148.0 MHz
- b 28.0 to 29.7 MHz and 144.0 to 146.0 MHz
- c 3.5 to 3.8 MHz and 7.0 to 7.1 MHz
- d 7.1 to 7.3 MHz and 10.1 to 10.15 MHz

10-1

Silicon, as used in diodes and transistors, has been doped to become:

- a a semiconductor
- b a superconductor
- c a conductor
- d an insulator

11-7

Four good electrical insulators are:

- a glass, air, plastic, porcelain
- b plastic, rubber, wood, carbon
- c glass, wood, copper, porcelain
- d paper, glass, air, aluminium

12-6

The unit for potential difference between two points in a circuit is the:

- a ampere
- b ohm
- c volt
- d coulomb

13-0

The voltage across a resistor carrying current can be calculated using the formula:

- a $E = I + R$ [voltage equals current plus resistance]
- b $E = I - R$ [voltage equals current minus resistance]
- c $E = I \times R$ [voltage equals current times resistance]
- d $E = I / R$ [voltage equals current divided by resistance]

14-0

When an 8 ohm resistor is connected across a 12 volt supply the current flow is:

- a 8 / 12 amp
- b 12 - 8 amp
- c 12 + 8 amp
- d 12 / 8 amp

15-2

The total current in a parallel circuit is equal to the:

- a current in any one of the parallel branches
- b applied voltage divided by the value of one of the resistive elements
- c source voltage divided by the sum of the resistive elements
- d sum of the currents through all the parallel branches

16-4

This combination of series resistors could replace a single 120 ohm resistor:

- a six 22 ohm
- b two 62 ohm
- c five 100 ohm
- d five 24 ohm

17-8

A simple transmitter requires a 50 ohm dummy load. You can fabricate this from:

- a four 300 ohm resistors in parallel
- b five 300 ohm resistors in parallel
- c six 300 ohm resistors in parallel
- d seven 300 ohm resistors in parallel

18-2

When two 500 ohm 1 watt resistors are connected in series, the maximum total power they can dissipate is:

- a 4 watt
- b 1/2 watt
- c 2 watt
- d 1 watt

19-9

The voltage applied to two resistors in series is doubled. The total power dissipated will:

- a decrease to half
- b double
- c not change
- d increase by four times

20-7

One GHz is equal to:

- a 1000 kHz
- b 10 MHz
- c 100 MHz
- d 1000 MHz

21-3

Two metal plates separated by air form a 0.001 uF capacitor. Its value may be changed to 0.002 uF by:

- a making the plates smaller in size
- b moving the plates apart
- c bringing the metal plates closer together
- d touching the two plates together

22-4

A transformer with 500 turns on the primary winding and 50 turns on the secondary winding is connected to 230 volt AC mains. The voltage across the secondary is:

- a 23 volt
- b 10 volt
- c 110 volt
- d 2300 volt

23-1

For your safety, before checking a fault in a mains operated power supply unit, first:

- a short the leads of the filter capacitor
- b check the action of the capacitor bleeder resistance
- c remove and check the fuse in the power supply
- d turn off the power and remove the power plug

24-8

In a forward biased PN junction, the electrons:

- a flow from n to p
- b flow from p to n
- c remain in the n region
- d remain in the p region

25-8

Two basic types of field effect transistors are:

- a NPN and PNP
- b n-channel and p-channel
- c germanium and silicon
- d inductive and capacitive

26-7

The electrode that is usually a cylinder of wire mesh in a thermionic valve is the:

- a filament (heater)
- b grid
- c cathode
- d anode

27-9

An rms-reading voltmeter is used to measure a 50 Hz sinewave of known peak voltage 14 volt. The meter reading will be about:

- a 14 volt
- b 28 volt
- c 10 volt
- d 50 volt

28-6

An attenuator network has 10 volt rms applied to its input with 5 volt rms measured at its output. The attenuation of the network is:

- a 6 dB
- b 10 dB
- c 20 dB
- d 40 dB

29-7

In an HF station, the connection between the SWR bridge and the switch used for selecting between multiple antennas, is normally a:

- a twisted pair cable
- b coaxial cable
- c quarter-wave matching section
- d short length of balanced ladder-line

30-0

In a frequency modulation receiver, this is connected to the input of the radio frequency amplifier:

- a the mixer
- b the frequency discriminator
- c the antenna
- d the limiter

31-2

In a single sideband and CW receiver, this is connected to the radio frequency amplifier and the high frequency oscillator:

- a the beat frequency oscillator
- b the product detector
- c the mixer
- d a filter

32-6

A receiver with high selectivity has a:

- a wide bandwidth
- b wide tuning range
- c narrow tuning range
- d narrow bandwidth

33-3

A communication receiver may have several IF filters of different bandwidths. The operator selects one to:

- a improve the S-meter readings
- b improve the reception of different types of signal
- c improve the receiver sensitivity
- d increase the noise received

34-8

An advantage of a double conversion receiver is that it:

- a does not drift off frequency
- b produces a louder audio signal
- c has improved image rejection characteristics
- d is a more sensitive receiver

35-7

The BFO is off-set slightly (500 - 1500 Hz) from the incoming signal to the detector. This is required:

- a to pass the signal without interruption
- b to beat with the incoming signal
- c to provide additional amplification
- d to protect the incoming signal from interference

36-9

Which list of emission types is in order from the narrowest bandwidth to the widest bandwidth:

- a CW, SSB voice, RTTY, FM voice
- b CW, RTTY, SSB voice, FM voice
- c CW, FM voice, RTTY, SSB voice
- d RTTY, CW, SSB voice, FM voice

37-5

In an elementary frequency modulation transmitter, this is located between the frequency multiplier and the antenna:

- a power amplifier
- b modulator
- c speech amplifier
- d oscillator

38-7

In a single sideband transmitter, the output of the variable frequency oscillator is connected to the:

- a mixer
- b antenna
- c balanced modulator
- d linear amplifier

39-2

The following signal can be amplified using a non-linear amplifier:

- a SSB
- b AM
- c FM
- d DSBSC

40-9

To minimise the radiation of one particular harmonic, one can use a:

- a resistor
- b wave trap in the transmitter output
- c high pass filter in the transmitter output
- d filter in the receiver lead

41-4

A parasitic oscillation:

- a is generated by parasitic elements of a Yagi beam
- b does not cause any radio interference
- c is produced in a transmitter oscillator stage
- d is an unwanted signal developed in a transmitter

42-7

A halfwave DC power supply operates from the New Zealand AC mains. The ripple frequency will be:

- a 50 Hz
- b 25 Hz
- c 70 Hz
- d 100 Hz

43-9

The purpose of a series pass transistor in a regulated power supply is to:

- a maintain the output voltage at a constant value
- b work as a surge multiplier to speed up regulation
- c amplify output voltage errors to assist regulation
- d suppress voltage spikes across the transformer secondary winding

44-3

A signal report of "5 and 1" indicates:

- a perfect intelligibility but very low signal strength
- b very low intelligibility but good signal strength
- c perfect intelligibility, high signal strength
- d medium intelligibility and signal strength

45-3

A repeater operating with a "positive 600 kHz split":

- a transmits on a frequency 600 kHz higher than its designated frequency
- b listens on a frequency 600 kHz higher than its designated frequency
- c transmits simultaneously on its designated frequency and one 600 kHz higher
- d uses positive modulation with a bandwidth of 600 kHz

46-7

The AGC circuit is to:

- a minimise the adjustments needed to the receiver gain control knobs
- b expand the audio gain
- c limit the extent of amplitude generation
- d amplitude limit the crystal oscillator output

47-6

The "Q" signal "shall I decrease transmitter power?" is:

- a QRL?
- b QRZ?
- c QRN?
- d QRP?

48-0

Any length of transmission line may be made to appear as an infinitely long line by:

- a shorting the line at the end
- b leaving the line open at the end
- c increasing the standing wave ratio above unity
- d terminating the line in its characteristic impedance

49-9

If an antenna feedline must pass near grounded metal objects, the following type should be used:

- a 75 ohm twinlead
- b coaxial cable
- c 300 ohm twinlead
- d 600 ohm open-wire

50-7

The wavelength for a frequency of 25 MHz is:

- a 15 metres
- b 12 metres
- c 32 metres
- d 4 metres

51-9

A half-wave antenna resonant at 7100 kHz is approximately this long:

- a 40 metres
- b 20 metres
- c 80 metres
- d 160 metres

52-0

A radio wave with a frequency of 3.8 MHz has a wavelength of:

- a 78.94cm
- b 7894m
- c 789.4m
- d 78.94m

53-2

An antenna type commonly used on HF is the:

- a parabolic dish
- b 13-element Yagi
- c helical Yagi
- d cubical quad

54-1

The medium which reflects high frequency radio waves back to the earth's surface is called the:

- a ionosphere
- b stratosphere
- c biosphere
- d troposphere

55-7

A variation in received signal strength caused by slowly changing differences in path lengths is called:

- a fading
- b absorption
- c fluctuation
- d path loss

56-2

A distant amplitude-modulated station is heard quite loudly but the modulation is at times severely distorted. A similar local station is not affected. The probable cause of this is:

- a transmitter malfunction
- b a sudden ionospheric disturbance
- c selective fading
- d front end overload

57-8

When someone in the neighbourhood complains of TVI it is wise to:

- a deny all responsibility
- b immediately blame the other equipment
- c check your log to see if it coincides with your transmissions
- d inform all the other neighbours

58-4

To reduce energy from an HF transmitter getting into a television receiver, the following could be placed in the TV antenna lead as close to the TV as possible:

- a active filter
- b low-pass filter
- c band reject filter
- d high-pass filter

59-3

A high-pass RF filter would normally be fitted:

- a at the antenna terminals of a TV receiver
- b between transmitter output and feedline
- c at the Morse key or keying relay in a transmitter
- d between microphone and speech amplifier

60-3

The following are three digital communication modes:

- a DSBSC, PACTOR, NBFM
 - b AMTOR, PACTOR, PSK31
 - c AGC, FSK, Clover
 - d PSK31, AFC, PSSN
-

Examination Candidate's Answer Sheet

See "Examination Instructions" on Page 1.

Examination Paper Code Number: _____ Date of Examination: _____

Candidate's Name: _____

Q No.	Candidate's Answer	Q No.	Candidate's Answer
01	a b c d	31	a b c d
02	a b c d	32	a b c d
03	a b c d	33	a b c d
04	a b c d	34	a b c d
05	a b c d	35	a b c d
06	a b c d	36	a b c d
07	a b c d	37	a b c d
08	a b c d	38	a b c d
09	a b c d	39	a b c d
10	a b c d	40	a b c d
11	a b c d	41	a b c d
12	a b c d	42	a b c d
13	a b c d	43	a b c d
14	a b c d	44	a b c d
15	a b c d	45	a b c d
16	a b c d	46	a b c d
17	a b c d	47	a b c d
18	a b c d	48	a b c d
19	a b c d	49	a b c d
20	a b c d	50	a b c d
21	a b c d	51	a b c d
22	a b c d	52	a b c d
23	a b c d	53	a b c d
24	a b c d	54	a b c d
25	a b c d	55	a b c d
26	a b c d	56	a b c d
27	a b c d	57	a b c d
28	a b c d	58	a b c d
29	a b c d	59	a b c d
30	a b c d	60	a b c d