

QADV

Practice Paper 1

for the RCF Advanced Level Exam in Radio Communications

This exam consists of a single paper with 62 questions

You will need a copy of the Licence
formula sheet
calculator
blue or black pens

Try to set aside 2 hours when you will not be distracted by phone calls, pets, children, cups of tea.
Before you begin, visit the loo.

For each question, put a tick in the [] alongside the correct answer.

Make sure your tick does not cover two boxes.

If you change your mind, scribble over the box with the first tick; then tick the correct box.

Any calculations can be done on the back of this question paper.

- 1 Go through the whole paper, answering all the questions you are sure of.
- 2 Go through the paper a second time; think about each remaining question and answer it if you can.
- 3 Go through the paper a third time.
For each question that is still unanswered, eliminate any options that you know are wrong; then make an intelligent guess at the correct answer.
Each question carries one mark.
Marks are **not** deducted for wrong answers.
So **do not leave any questions unanswered.**
- 4 Check your calculations.
- 5 Look over your answers until time is up.

Start time _____

Duration 2 hours

End time _____

- 1 The Regional Secondary Locator in the callsign GM8KZB indicates that the Radio Equipment is being used in
- A The Isle of Man
- B Scotland
- C England
- D Guernsey
- 2 The Salvation Army and the WRVS are among the organisations designated by the Licence as
- A Voluntary Bodies
- B Auxiliary Agencies
- C Relief Operations
- D User Services
- 3 A person on a Recognised Foundation Training Course is permitted to operate the Radio Equipment of a Full Licence holder, provided that
- A the Licensee holds the microphone
- B a maximum power of 50W (17dBW) is employed
- C the transmission lasts no longer than 5 minutes
- D the Licensee has direct supervision
- 4 What is needed before installing Radio Equipment in a Vessel?
- A A certificate of insurance for the Radio Equipment.
- B The written permission of the Vessel's master.
- C Type approval of the Radio Equipment from HM Revenue and Customs.
- D Notification to Ofcom of the name of the Vessel.
- 5 CEPT Recommendation T/R 61-01 relates to radio amateurs who are
- A temporary visitors to another country
- B operating /MM on a Vessel not registered in the UK
- C permanently resident abroad
- D relaying messages via amateur satellites
- 6 Which of the following conditions apply to messages sent by UK Amateurs?
- (1) They must be in English
- (2) They must be un-encrypted
- (3) They must be free of menace
- A (1) and (2) only.
- B (1) and (3) only.
- C (2) and (3) only.
- D All three of them.
- 7 The Licence recommends that any communication links to remotely controlled Radio Equipment should use bands above
- A 30MHz
- B 100MHz
- C 200MHz
- D 400MHz
- 8 A permanent record (log) of the operation of Radio Equipment **must** be kept
- A during a contest
- B when functioning as a beacon
- C at the request of a person authorised by Ofcom
- D if operating Maritime Mobile in international waters
- 9 Ofcom may revoke the Licence if the Licensee does not confirm that the relevant details are still correct after a lapse of
- A 5 years
- B 10 years
- C 15 years
- D 20 years

10 On which one of the following frequencies is a Full Licence holder permitted to use 400W (26 dBW)?

A 1.86MHz C 70.20MHz

B 51.45MHz D 145.0MHz

11 A Power Supply Unit has an EMF of 500.0V. When 15A is drawn from it, the PD between its terminals falls to 486.5V.

The source resistance of the PSU is

A 0.3 Ω C 0.9 Ω

B 0.6 Ω D 1.2 Ω

12 A capacitor is formed of 2 parallel plates. What should be done to make the capacitance four times as large?

A Double the area of the plates and double the distance between them.

B Double the area of the plates and halve the distance between them.

C Halve the area of the plates and double the distance between them.

D Halve the area of the plates and halve the distance between them.

13 Which one of the following actions will increase the inductance of an inductor?

A Removing the ferrite core.

B Making the diameter of the coil smaller.

C Adding to the number of turns on the coil.

D Increasing the spacing between the turns.

14 An alternating current in the form of a sine wave has a peak value of 24V. What is its RMS value?

A 17V. C 19V.

B 18V. D 20V.

15 What is the inductive reactance of an inductor of 10 microhenries at a frequency of 25MHz?

[Take π as 3.14]

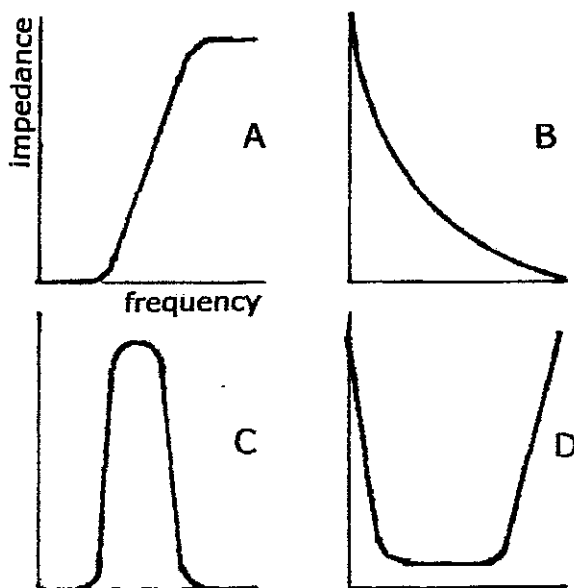
A 1464 ohms.

B 1570 ohms.

C 1676 ohms.

D 1782 ohms.

16



Which one of these graphs shows the impedance of a parallel resonant circuit?

A Graph A.

B Graph B.

C Graph C.

D Graph D.

17 Why are the iron laminations in a mains transformer coated with varnish?

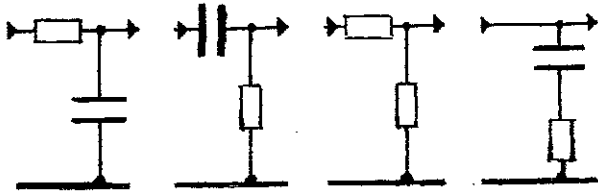
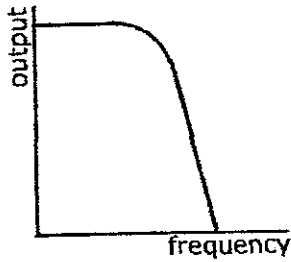
A To isolate the primary and secondary windings.

B To increase the permeability.

C To minimise corrosion.

D To prevent eddy currents.

18



Circuit A Circuit B Circuit C Circuit D

Which of these circuits matches the graph?

- A Circuit A.
- B Circuit B.
- C Circuit C.
- D Circuit D.

19 Oscillator circuits are built with a combination of components with negative and positive temperature coefficients in order to

- A maintain oscillation across a wide frequency range
- B obtain maximum frequency stability
- C minimise the current drawn by the oscillator
- D stabilize the circulating current

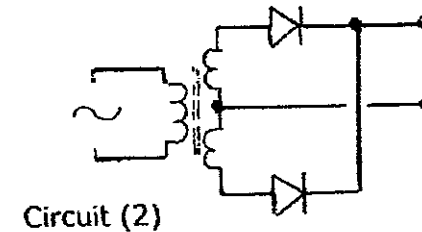
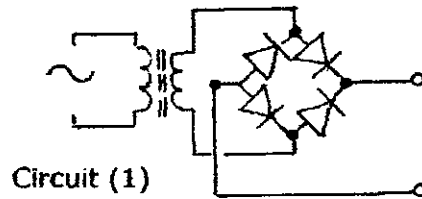
20 If the p-n junction of a transistor is reverse biased, then

- A the depletion layer widens and no current flows
- B the depletion layer widens and current flows
- C the depletion layer narrows and no current flows
- D the depletion layer narrows and current flows

21 Which one of the following would be the best choice as the input of an electronic voltmeter?

- A pnp transistor.
- B npn transistor.
- C FET.
- D triode valve.

22



Which of these rectifier circuits would give a half-wave output?

- A Neither of them.
- B Circuit (1) only.
- C Circuit (2) only.
- D Both of them.

23 In a receiver employing direct digital synthesis, what is the effect of increasing the number of digits in the synthesiser?

- A More current will be drawn from the power supply.
- B The purity of the signal will be improved.
- C The bandwidth of the signal will increase.
- D It will take less time to change from transmit to receive and vice versa.

24 Why are frequency multipliers biased in Class C?

- A To generate harmonics.
- B To reduce distortion.
- C To minimise the current.
- D To stabilize the frequency.

25 What is the relative bandwidths of these modes of modulation?

narrowest ←————→ broadest

- A AM SSB FM
- B SSB FM AM
- C FM AM SSB
- D SSB AM FM

26 Which of the following modes of modulation require a power amplifier to be linear?

- A CW and FM.
- B AM and SSB.
- C AM and CW.
- D SSB and FM.

27 'Key clicks' on a CW transmission are caused by

- A an unstabilized power supply
- B selective refractions from the ionosphere
- C the carrier rising and falling too rapidly
- D sending the Morse at too many words per minute

28 Unplanned resonances in a amplifier can result in

- A intermodulation
- B frequency drift
- C excessive bandwidth
- D parasitic oscillation

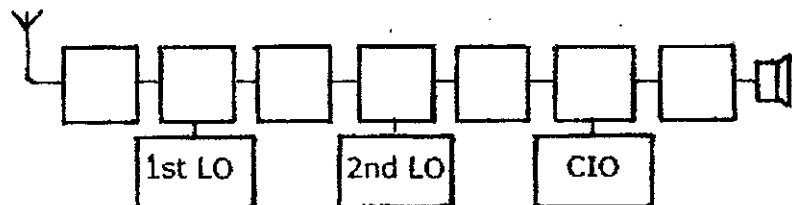
29 If the phase locked loop in a frequency synthesiser fails to lock, then

- A the frequency display will flash
- B the output will be inhibited
- C the carrier will be un-modulated
- D the frequency of the transmission will drift

30 The level of the hiss coming out of a receiver's loudspeaker when no signal is present is known as its

- A intermodulation product
- B selectivity
- C noise floor
- D cut-off point

31

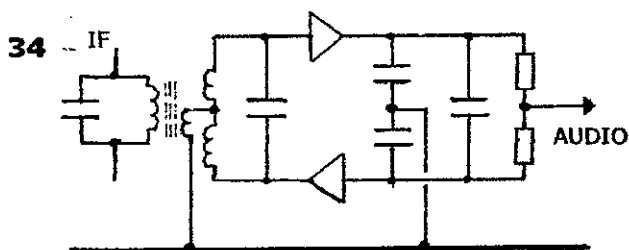


What sort of receiver has this block diagram?

- A tuned radio frequency (TRF)
- B (single) superhet
- C double superhet
- D direct digital synthesis

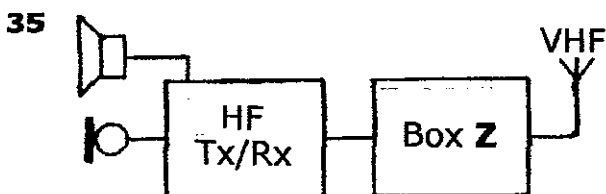
- 32 The overall sensitivity of a receiver depends on the sensitivity of its
- A RF stage
 - B local oscillator
 - C mixer
 - D IF stage(s)

- 33 A receiver tuned to 145.5 MHz has an IF of 45.0 MHz. What are the two possible frequencies of the local oscillator?
- A 90.5 and 135.5 MHz
 - B 100.5 and 190.5 MHz
 - C 110.5 and 235.5 MHz
 - D 120.5 and 291.5 MHz



What mode of transmission is this circuit designed to demodulate?

- A CW
- B AM
- C SSB
- D FM



Box Z contains a

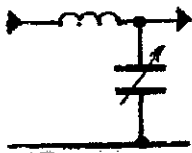
- A transverter
- B high-pass filter
- C balun
- D antenna matching unit

- 36 What is the approximate length of a half wavelength of coaxial cable with solid polythene dielectric at 29.0 MHz?
- A 3.5 metres
 - B 4.8 metres
 - C 6.8 metres
 - D 9.5 metres

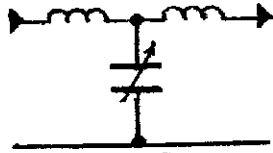
- 37 When cutting an antenna to size, what is the 'end factor correction' that has to be applied to the free space length?
- A $\times 0.65$
 - B $\times 0.75$
 - C $\times 0.85$
 - D $\times 0.95$

- 38 A quad antenna is constructed in the form of a square. What fraction of a wavelength is the length of each side of the square?
- A one eighth
 - B one quarter
 - C one third
 - D one half

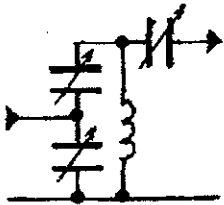
- 39 Which of the following formula relating to Return Loss at a transmitter is correct?
- A (Feeder Loss) + (Return Loss at antenna)
 - B (Return Loss at antenna) - (Feeder Loss)
 - C $2 \times$ (Feeder Loss) + (Return Loss at antenna)
 - D (Return Loss at antenna) - $2 \times$ (Feeder Loss)



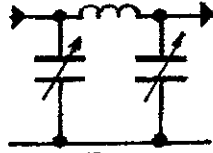
Circuit A



Circuit B



Circuit C



Circuit D

Which of these Antenna Tuning Units has a **pi** circuit?

- A Circuit A.
 B Circuit B.
 C Circuit C.
 D Circuit D.

41 What sort of communication uses a helical antenna?

- A Short skip.
 B Satellite.
 C Repeater.
 D Tropospheric.

42 Signals propagated by a single refraction from the E layer of the ionosphere may be heard up to a distance of about

- A 2000 km
 B 4000 km
 C 8000 km
 D 12000 km

43 At what time during a 24 hour period is the D layer of the ionosphere likely to be most strongly ionised?

- A Midnight.
 B Daybreak.
 C Noon.
 D Sunset.

44 10.7 MHz and 465 kHz are frequencies commonly used for

- A pagers
 B radio controlled models
 C beacons for propagation research
 D IFs of domestic receivers

45 Which mode of modulation of radio amateur signals is **least** likely to cause cross-modulation in other devices?

- A CW
 B AM
 C SSB
 D FM

46 The proper name for the 'rusty bolt effect' is

- A blocking
 B overloading
 C common mode interference
 D passive intermodulation

47 The special type of 'voltage dependent' resistors found in mains filters

- A stabilize the output to 230V
 B cut off spikes of high voltage
 C set a maximum value of current through the filter
 D present a low impedance to the incoming 50Hz

- 48 The simplest way to increase the inductance of a wire is to
- A connect a ceramic capacitor between it and earth
 - B apply a higher voltage
 - C increase its diameter
 - D clip a split ferrite ring over it
- 49 An antenna is radiating a power of 17dBW (50W). What is the field strength at a distance of 1km from the antenna?
- A 0.05 volts per metre.
 - B 0.70 volts per metre.
 - C 0.98 volts per metre.
 - D 1.37 volts per metre.
- 50 A possible cause of EMC problems in an unbalanced system that does not arise with a balanced system is
- A a high SWR
 - B the radiation of harmonics
 - C RF current on the coax outer
 - D the generation of unwanted mixer products
- 51 On receiving a complaint about interference to a nearby radio, the first thing a radio amateur should do is
- A fit a ferrite ring on the mains lead of the radio
 - B sit down and talk it through with the neighbour
 - C find out if the radio is under guarantee
 - D consult the Ofcom website www.Ofcom.org.uk
- 52 Which one of the following could be the callsign of a Mailbox?
- A GB3KZB.
 - B GB5KZB.
 - C GB7KZB.
 - D GB9KZB.
- 53 Which of the following statements is/are true about CTCSS in connection with repeaters?
- (1) continuous during access
 - (2) below audio frequencies
- A Neither statement is true.
 - B Only statement (1) is true.
 - C Only statement (2) is true.
 - D Both statements are true.
- 54 Which one of the following types of station **always** requires a particular callsign issued specifically for the occasion?
- A Club station.
 - B Special event station.
 - C Talk-in station for a rally.
 - D Demonstration station at a fete.
- 55 On which one of the following bands do contests take place?
- A 7MHz (40m).
 - B 10MHz (30m).
 - C 18MHz (17m).
 - D 24MHz (12m).

- 56** All the following safety precautions are important. Which one is the **most** important?
- A Earth leakage trip.
 - B LED or neon warning lights.
 - C Double-pole master switch.
 - D Cables of adequate current carrying capacity.

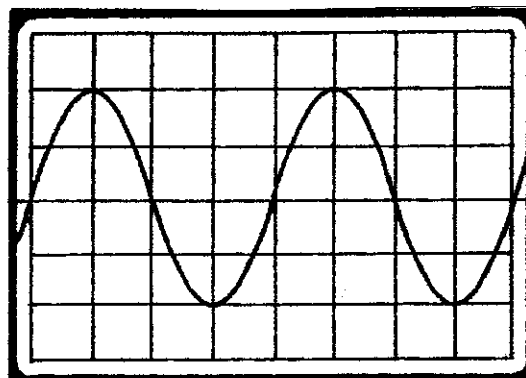
- 57** Reference Levels recommending maximum safe levels of exposure to RF radiation for each of the amateur bands are published by
- A Ofcom
 - B RSGB
 - C Health Protection Agency
 - D Health and Safety Executive

- 58** The interior of a commercial static discharge device contains
- A inert gas
 - B a vacuum
 - C carbon dioxide
 - D compressed dry air

- 59** To measure a large current with a moving coil meter
- A connect a high value resistor in parallel with it
 - B connect a low value resistor in parallel with it
 - C connect a high value resistor in series with it
 - D connect a low value resistor in series with it

- 60** Which one of the following would give the **least** accurate measure of frequency?
- A Crystal callibrator.
 - B Heterodyne wavemeter.
 - C Digital frequency counter.
 - D Absorption wavemeter.

61



The vertical amplifier in this oscilloscope is set to 200mV per division. What is the peak-to-peak voltage of the waveform shown?

- A 0.2V
- B 0.4V
- C 0.6V
- D 0.8V

- 62** Why measure SWR?
- A To check the bandwidth of a transmission.
 - B To prevent over-modulation.
 - C To measure the output from a transmitter.
 - D To monitor the match on a feeder.

QADV Practice Paper 1 Key

Advance! The Full Licence Manual

		Syllabus	Licence			
1	B	8	2a.1	2.2	31	C 64 4k.1
2	D	8	2b.1	17(qq)	32	A 62 4l.1
3	D	6	2c.1	3(3)	33	B 63 4m.1
4	B	7	2d.1	9(4)	34	D 67 4o.1
5	A	7	2e.1	16(1)	35	A 70 4q.1
6	C	8	2f.1	11	36	A 74 5a.1
7	A	9	2g.1	Note g	37	D 75 5c.1
8	C	9	2h.1	12(1)	38	B 76 5c.4
9	A	-	2i.1	6(3)	39	C 73 5d.3
10	D	10	2j.1	Schedule 1	40	D 79 5e.1
11	C	22,24	3a.1		41	B 80 6a.1
12	B	24,25	3e.1		42	A 81 6b.2
13	C	26	3f.2		43	C 81 6b.6
14	A	27,28	3g.1		44	D 90 7a.1
15	B	29	3h.1		45	D 89 7a.2
16	C	30,31	3i.2		46	D 90 7a.5
17	D	32	3j.3		47	B 92,93 7b.1
18	A	91	3k.1		48	D 91 7b.3
19	B	33	3m.1		49	A 86 7c.1
20	A	34	3n.1		50	C 71,72 7d.1
21	C	41,97	3n.6		51	B 95 7f.1
22	A	35,36	3p.1		52	C 11 8a.1
23	B	48	4c.1		53	D 12 8b.1
24	A	49	4d.1		54	B 13 8d.1
25	D	44-46	4f.2		55	A 13 8e.1
26	B	52	4g.1		56	C 14 9a.1
27	C	59	4h.2		57	C 16 9d.1
28	D	57,58	4h.4		58	A 17 9e.1
29	B	48	4h.6		59	B 96 10a.1
30	C	62	4j.3		60	D 99-101 10b.1
					61	D 100 10c.1
					62	D 73 10e.1