

QADV Practice Paper 2

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
bandplans for 2m and 20m
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** _____

Sources of the reference material needed for the Exam (Licence, bandplans, formulas) can be found at <http://freespace.virgin.net/murray.g3kzb/>
The website also gives details of other Practice Papers.

- 1** A Licensee may append the suffix 'P' to the callsign when operating
- A [] with hand-held equipment
- B [] from a temporary location
- C [] away from mains power
- D [] from a parked vehicle
- 2** In which of the following happenings may a Licensee use the Radio Equipment to assist communications?
- In times of (1) national emergency
(2) international emergency
(3) disaster
- A [] (1) and (2) only.
- B [] (1) and (3) only.
- C [] (2) and (3) only.
- D [] All three of them.
- 3** If the Licensee controls the equipment, under what circumstances may a non-licensed person talk into the microphone?
- A [] Under no circumstances.
- B [] Only if the Licensee holds a Full Licence.
- C [] Only if the Licensee holds a Intermediate or Full Licence.
- D [] If the Licensee holds any UK Amateur Radio Licence.
- 4** When must a 'Maritime Mobile' operation cease?
- A [] If the vessel is carrying flammable cargo.
- B [] When entering harbour or canal.
- C [] In a designated danger area.
- D [] On the instruction of the vessel's master.
- 5** What frequency bands are available to a Full UK Licensee operating /MM in international waters?
- A [] The bands allocated for use in the UK.
- B [] The top 10kHz of each band in Schedule 1 of the Licence.
- C [] The bands allocated by the ITU in the region where the vessel is located.
- D [] The bands set aside by the ITU for /MM operations.
- 6** Which of the following conditions apply to messages sent by Radio Amateurs?
- (1) They must not be of a menacing character.
- (2) They must not be grossly offensive.
- (3) They must not be indecent or obscene.
- A [] (1) and (2) only.
- B [] (1) and (3) only.
- C [] (2) and (3) only.
- D [] All three of them.
- 7** Which one of the following restrictions applies to the Remote Control of Radio Equipment by a Full Licence holder?
- A [] The control signal must not exceed 0.5 watts in power.
- B [] It must not allow other Amateurs unsupervised use of the Equipment.
- C [] It must only be used with a Club callsign.
- D [] A Notice of Variation to the Licence must be obtained for Ofcom.
- 8** The callsign given in the Licence, together with a Regional Secondary Location if appropriate, must be transmitted at intervals not exceeding
- A [] 10 minutes
- B [] 15 minutes
- C [] 30 minutes
- D [] 45 minutes

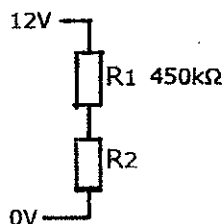
9 The frequency of a transmission must be as stable as

- A [] technical development reasonably permits
- B [] 1 part in 100,000
- C [] required by a duly authorized officer of Ofcom
- D [] necessary to prevent undue interference to users on adjacent frequencies

10 Which one of the following bands has an allocation to the Amateur Satellite Service?

- A [] 1.810 — 2.000 MHz.
- B [] 3.500 — 3.800 MHz.
- C [] 50.00 — 52.00 MHz.
- D [] 144.0 — 146.0 MHz.

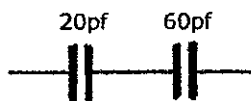
11



In this figure, what value of R2 will make the voltage at the junction of R1 and R2 3V?

- A [] 150kΩ.
- B [] 200kΩ.
- C [] 250kΩ.
- D [] 300kΩ.

12



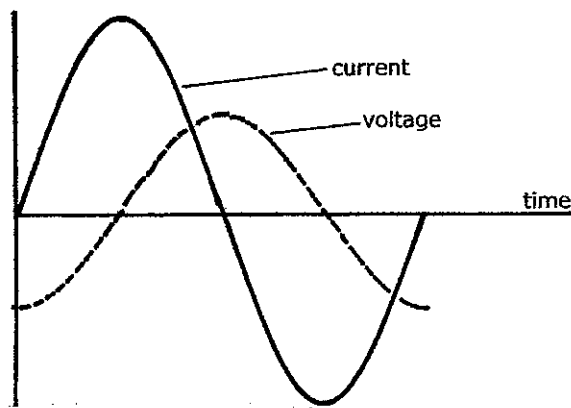
The combined capacitance of these two capacitors in series is

- A [] 5pf
- B [] 10pf
- C [] 12pf
- D [] 15pf

13 A circuit consisting of a resistor and inductor in series has a time constant of 12msecs. After voltage is applied, the final value of the current will be reached after approximately

- A [] 30msecs
- B [] 60msecs
- C [] 90msecs
- D [] 120msecs

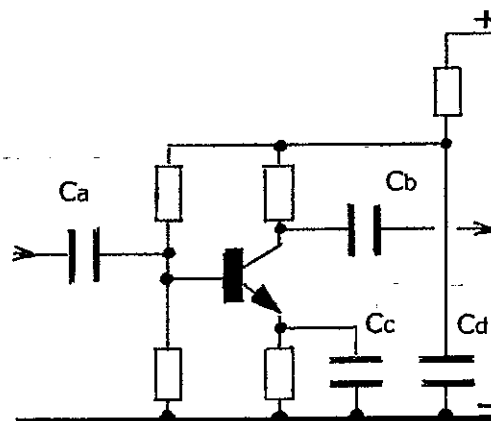
14



What is the phase difference between the voltage and current shown on this graph?

- A [] 90°
- B [] 180°
- C [] 270°
- D [] 360°

15



Which capacitor decouples this amplifier from the rest of the circuit?

- A [] Ca
- B [] Cb
- C [] Cc
- D [] Cd

16 Which one of the following is decreased if a damping resistor is added to a resonant circuit?

- A [] Bandwidth.
- B [] Q factor.
- C [] Resonant frequency.
- D [] Phase angle.

17 A 15 ohm loudspeaker is driven from a 6,000 ohm source. What ratio of transformer is required?

- A [] 5 : 1
- B [] 20 : 1
- C [] 250 : 1
- D [] 500 : 1

18 The cut-off frequency of a low-pass filter is defined as the frequency at which the output voltage has fallen to

- A [] 0.404 of its maximum value
- B [] 0.505 of its maximum value
- C [] 0.606 of its maximum value
- D [] 0.707 of its maximum value

19 The power gain of an amplifier is 9dB. By how many times is the power increased?

- A [] 8 times. C [] 18 times.
- B [] 12 times. D [] 27 times.

20 If the reverse bias on a varicap diode is increased, then

- A [] the depletion layer is widened and the capacitance is increased
- B [] the depletion layer is narrowed and the capacitance is increased
- C [] the depletion layer is widened and the capacitance is decreased
- D [] the depletion layer is narrowed and the capacitance is decreased

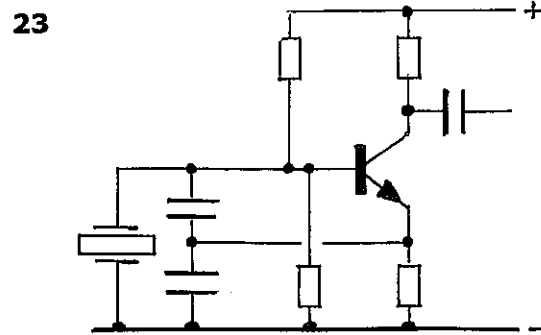
21 In which class of transistor amplifier does collector current flow all the time that voltage is applied?

- A [] Class A. C [] Class B.
- C [] Class AB. D [] Class C.

22 If the smoothing capacitor in a half-wave rectifier circuit is increased in size, what will happen to the current through the rectifier?

peak current duration of current

- A [] increase increase
- B [] decrease increase
- C [] increase decrease
- D [] decrease decrease



This is the circuit of a

- A [] buffer amplifier
- B [] frequency synthesiser
- C [] crystal oscillator
- D [] variable frequency oscillator

24 Within a transmitter, a modulated signal is produced on 5.0 MHz. To give an output on 80m (3.5 to 3.8 MHz), it is mixed with a synthesiser signal on 10.0 to 10.3 MHz. Also produced (and filtered out) is an unwanted mixer product on

- A [] 6.5 to 6.8 MHz
- B [] 15.0 to 15.3 MHz
- C [] 23.5 to 23.8 MHz
- D [] 32.0 to 32.3 MHz

25 The bandwidth of an amateur AM signal is approximately

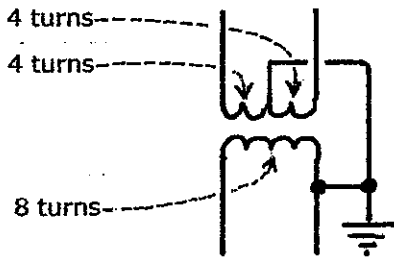
- A [] 1.5 kHz
- B [] 3 kHz
- C [] 6 kHz
- D [] 12 kHz

26 From which part of a triode valve are electrons emitted?

- A [] Anode.
- B [] Grid.
- C [] Cathode.
- D [] Heater.

- 27** With which mode of transmission is the fault 'chirp' associated?
- A [] CW.
- B [] AM.
- C [] SSB.
- D [] FM.
- 28** A notch filter can be used to
- A [] separate the CTCSS sub-audible tone from speech entering a repeater
- B [] reduce excessive bandwidth caused by overdriving a linear amplifier
- C [] remove one particular harmonic from the output of a transmitter
- D [] remove 50 Hz mains hum from an audio stage
- 29** From which part of a frequency synthesiser is the 'out-of-lock' indicator obtained?
- A [] Crystal reference oscillator.
- B [] Programmable divider.
- C [] Phase comparator.
- D [] Voltage controlled oscillator.
- 30** 'SINAD' in a receiver is related to its
- A [] selectivity
- B [] dynamic range
- C [] signal to noise ratio
- D [] image rejection
- 31** In a superhet SSB receiver, how is the audio produced?
- A [] The IF mixes with the CIO.
- B [] The RF mixes with the IF.
- C [] The LO mixes with the RF.
- D [] The CIO mixes with the LO.
- 32** What happens if two IF coils are over-coupled?
- A [] An AGC voltage is produced.
- B [] The response has a dip at its centre.
- C [] Sensitivity is at a maximum.
- D [] Self oscillation occurs.
- 33** Double superhet receivers have
- A [] a low first IF for image rejection and a high second IF for selectivity
- B [] a low first IF for selectivity and a high second IF for image rejection
- C [] a high first IF for image rejection and a low second IF for selectivity
- D [] a high first IF for selectivity and a low second IF for image rejection
- 34** The AGC circuit in a receiver can also be used to
- A [] drive the S meter
- B [] change the receiver bandwidth
- C [] improve the SWR
- D [] remove spikes of interference
- 35** What does the RIT control on a receiver do?
- A [] Varies the receiver bandwidth.
- B [] Tunes the receiver over a narrow range.
- C [] Limits the peak value of the RF.
- D [] Allows particular frequencies to be stored in memory.

36



This is the diagram of a

- A [] 1 : 1 balun
- B [] braid breaker
- C [] IF transformer
- D [] harmonic filter

37 The feed point impedance of a loaded vertical five-eighths wavelength antenna is approximately

- A [] 37Ω
- B [] 50Ω
- C [] 73Ω
- D [] 300Ω

38 The 'traps' in a HF trap dipole antenna are

- A [] low pass filters
- B [] high pass filters
- C [] series tuned circuits
- D [] parallel tuned circuits

39 V_f and V_r are the forward and reverse voltages measured on a Standing Wave Ratio meter.
The SWR =

- | | |
|--|--|
| A [] $\frac{V_f - V_r}{V_f \times V_r}$ | C [] $\frac{V_f + V_r}{V_f - V_r}$ |
| B [] $\frac{V_f - V_r}{V_f + V_r}$ | D [] $\frac{V_f \times V_r}{V_f + V_r}$ |

40 The 'roller coaster' form of variable inductor is commonly found in

- A [] an Antenna Matching Unit
- B [] a Standing Wave Ratio meter
- C [] an oscilloscope
- D [] a transverter (HF to/from VHF)

41 The amount of electromagnetic energy falling on an area of 1 square metre is called the

- A [] field strength
- B [] velocity factor
- C [] power flux density
- D [] incident power

42 Ionisation in the atmosphere is caused by

- A [] the earth's magnetic field
- B [] jet streams where the troposphere and stratosphere meet
- C [] solar emissions
- D [] over-the-horizon radars

43 The longest range obtainable by ground wave propagation is normally over

- A [] deserts
- B [] seas
- C [] mountains
- D [] rain forests

44 When a receiver is tuned to F_r a faint signal on a higher frequency of F_i can be heard at the same time.
What is the frequency of the local oscillator?

- | | |
|-------------------------------------|-----------------------------|
| A [] $F_i - F_r$ | C [] $F_i + F_r$ |
| B [] $\frac{F_i + F_r}{F_i - F_r}$ | D [] $\frac{F_i + F_r}{2}$ |

- 45** Why is an FM signal less likely to cause cross-modulation in receivers than other modes of modulation?
- A [] The amplitude of the carrier remains constant.
- B [] None of the power is contained in sidebands.
- C [] It is not possible for an FM signal to be over-modulated.
- D [] The duty cycle of the carrier is small.
- 46** Tests have shown that a base-emitter junction in an audio amplifier is acting as a rectifier for an RF signal. To cure the interference, which one of the following capacitors should be wired across the base-emitter leads?
- A [] 1nF disc ceramic.
- B [] 1000 μ F electrolytic.
- C [] 10pF polystyrene.
- D [] 1 μ F polyester.
- 47** In a cable containing two wires, a common mode current flows
- A [] in alternate wires on alternate cycles of AC
- B [] in both wires but in opposite directions
- C [] only in one wire
- D [] in the same direction in both wires
- 48** If a 2 metre signal is breaking through onto a TV, what should be fitted in the TV downlead to prevent this?
- A [] Balun.
- B [] Attenuator.
- C [] Low-pass filter.
- D [] High-pass filter.
- 49** A 40 watt transmitter is feeding an antenna with a gain of 6dB through a feeder with a 3db loss. What is the field strength 60 metres from the antenna?
- A [] 1.04 volts per metre.
- B [] 2.08 volts per metre.
- C [] 3.12 volts per metre.
- D [] 4.26 volts per metre.
- 50** In which part of a car's electrics does induced RF pose the greatest hazard?
- A [] Head and rear lights.
- B [] Engine management system.
- C [] Front and rear screen wipers and washers.
- D [] In-car broadcast radio.
- 51** If a Radio Amateur's signals are causing problems on a neighbour's computer and the neighbour is not willing to cooperate in finding a cure, the Amateur should advise him to contact
- A [] RSGB
- B [] Ofcom
- C [] Citizens Advice Bureau
- D [] Trading Standard Department of the local council
- 52** By which of the following ways can a Packet Radio message reach its destination?
- (1) directly if within range
 (2) via a mailbox
 (3) using a digipeater
- A [] (1) and (2) only.
- B [] (1) and (3) only.
- C [] (2) and (3) only.
- D [] All three ways.

53 What happens when a repeater 'times out'?

- A [] It is closed down by the Repeater Keeper.
- B [] Its Notice of Variation is revoked by Ofcom.
- C [] It transmits the current time in the format used by MSF.
- D [] It stops re-transmitting the incoming signal.

54 Intermodulation products generated within a receiver can be minimised by

- A [] turning back the squelch
- B [] switching in an attenuator
- C [] reducing the audio output
- D [] increasing the IF bandwidth

55 In which part of the 2m band do satellite communications take place?

- A [] 144-000 to 144-110 MHz.
- B [] 144-400 to 144-490 MHz.
- C [] 145-200 to 145-5935 MHz.
- D [] 145-800 to 146-000 MHz.

56 Why is special care needed when dealing with equipment containing thermionic valves?

- A [] Valves are mechanically fragile.
- B [] Valved equipment contains high voltages.
- C [] Large currents are involved.
- D [] Replacement valves are now difficult to obtain.

57 The less RF radiation to which an adult is exposed the better, and it should never be more than

- A [] 0.05 milliwatts per square centimetre
- B [] 0.2 milliwatts per square centimetre
- C [] 0.8 milliwatts per square centimetre
- D [] 3.2 milliwatts per square centimetre

58 In a PME mains wiring system, the neutral conductor is

- A [] isolated from earth
- B [] connected to earth at the electricity substation
- C [] connected to earth where the supply enters the house
- D [] connected to earth at the electricity generator

59 How can a high voltage be measured with a 100 μ A moving coil meter?

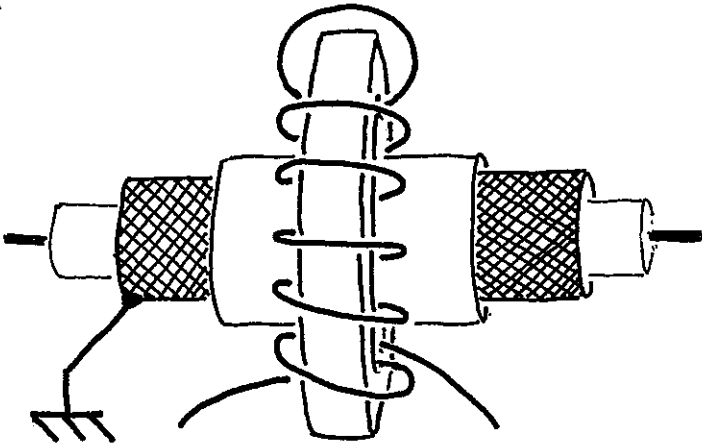
- A [] By connecting a high value resistor in parallel with it.
- B [] By connecting a low value resistor in parallel with it.
- C [] By connecting a high value resistor in series with it.
- D [] By connecting a low value resistor in series with it.

60 The overall accuracy of a digital frequency counter is limited by the

- A [] number of digits on the display
- B [] stability of the gate time
- C [] input impedance
- D [] losses in the probe

- 61 What happens when the knob labelled 'Y GAIN' on an oscilloscope is turned anti-clockwise?
- A [] Each sweep of the trace is slower.
 - B [] The whole of the trace moves down.
 - C [] The height of the trace decreases.
 - D [] The trace becomes fainter.

62



This drawing shows a current transformer as found in an SWR meter.
The earthed braid of the coax

- A [] reduces eddy currents
- B [] maximises the sensitivity
- C [] prevents voltage flashover
- D [] minimises capacitive coupling

----- End of questions -----

QADV Practice Paper 2 Key

Advance! The Full Licence Manual

			Advance!	Syllabus	Licence			
1	B	-		2a.1	Note (d)	31	A	67,68 4k.1
2	D	8		2b.1	1(3)	32	B	65 4n.2
3	B	6		2c.1	3(4)	33	C	63 4n.1
4	D	7		2d.1	9(5)	34	A	65 4p.1
5	C	7		2e.1	9(6)	35	B	- 4r.1
6	D	8		2f.1	Note (h)	36	A	71 5b.1
7	B	9*		2g.1	10(3)	37	B	75 5c.3
8	B	9		2h.1	13(1)	38	D	77 5c.5
9	A	-		2i.1	7(1)(a)	39	C	73 5d.1
10	D	10		2j.1	Schedule 1 Table C	40	A	79 5e.1
11	A	23		3d.1		41	C	80 6a.2
12	D	26		3e.5		42	C	81 6b.2
13	B	27		3f.3		43	B	83 6c.1
14	A	28		3g.3		44	D	90 7a.1
15	D	30,38		3h.3		45	A	89 7a.2
16	B	32		3i.4		46	A	94 7a.4
17	B	32		3j.2		47	D	- 7b.2
18	D	91		3k.1		48	D	91,92 7b.5
19	A	102		3o.1		49	A	86 7c.1
20	C	36		3n.3		50	B	16 7e.1
21	A	40		3n.7		51	B	95 7f.1
22	C	35		3p.1		52	D	11 8a.1
23	C	47		4b.1		53	D	12 8b.1
24	B	52		4e.1		54	B	89 8c.1
25	C	44,61		4f.2		55	D	13 8e.1
26	C	43		4g.3		56	B	14 9a.4
27	A	55		4h.2		57	B	16 9d.1
28	C	57,92		4h.3		58	C	17,95 9f.1
29	C	48		4h.6		59	C	96 10a.1
30	C	61		4j.3		60	B	101 10b.2
61	C	100						10c.1
62	D	98						10e.1

* Note the correction to page 9 of Advance! 3rd edition given in www.rsgb.org/books/extra/advance.htm