



# Radio Communications Foundation Intermediate Level Examination in Radio Communications

This paper consists of 45 questions, Duration 75 minutes.

## INSTRUCTIONS TO CANDIDATES

- You should have 2 items.
1. This question paper
  2. The Schedule to the Intermediate Amateur Licence

All questions have equal marks and all questions should be attempted.

Each question has 4 possible answers, identified 'A' 'B' 'C' and 'D'. Only one answer is correct, the others are wrong. You should decide which of the 4 answers is the correct one and mark the answer box for each question accordingly.

If you decide answer 'C' is correct, show this by ticking in the box marked 'C'. **Take care to ensure your tick does NOT cover two boxes.**

A [ ] A [ ✓ ]

B [ ] B [ ]

C [ ✓ ] C [ ]

D [ ] D [ ]

If you then change your mind, shade out the tick and tick the box for your new choice.

The Schedule to the licence may be used to help answer any question.

You may also use a calculator.

**This paper will contain your answers and must be handed in at the end of the assessment.**

Please fill in the details below before the start.

Family Name:	
First names:	
Date of birth:	
Candidate Number:	
Test centre location:	
Date of Test:	

## **Notice to candidates**

You must not talk to or distract any other candidate in the exam room.

You are not allowed any assistance with the exam questions and the invigilator is not permitted to discuss exam questions.

If you need other assistance, please raise your hand and talk quietly to an invigilator when approached.

You may not leave the exam room without permission and may not re-enter the room unless an invigilator has escorted you at all times.

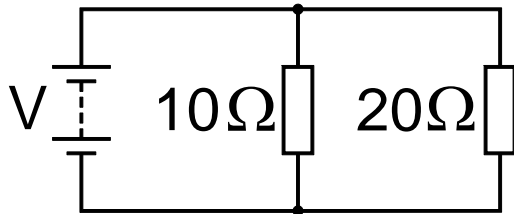
You must use a blue or black pen for your answers and any calculations may be done on the reverse of the question paper.

- 1 An amateur has the call sign MM3XYZ. He is
  - A maritime mobile
  - B an Intermediate licence holder living in Scotland
  - C a Foundation licence holder living in Scotland
  - D a Full licence holder living in Scotland.
  
- 2 Which one of the messages below should you NOT send?
  - A A message to an overseas amateur of any country.
  - B A message to an overseas amateur whose administration has not agreed to T/R 61-01.
  - C A message relating to running a business.
  - D A message to a large group of amateurs.
  
- 3 If a radio contact with another amateur lasts 11 minutes, then to comply with the licence the call sign must be given
  - A when establishing contact
  - B when establishing and breaking contact
  - C when establishing and breaking contact and at five minute intervals
  - D when establishing and breaking contact and at ten minute intervals.
  
- 4 Which answer best describes the locations from which an Intermediate amateur may transmit whilst on a vessel?
  - A Inland enclosed waters.
  - B The landward side of the low-water line.
  - C The seaward side of the low-water line.
  - D All waters including the high seas.
  
- 5 An amateur must keep a log
  - A of all transmissions from the station.
  - B of all times when the station is in use.
  - C only when requested by a person authorised by Ofcom
  - D of checks performed from time to time to ensure undue interference is not caused.
  
- 6 If an amateur radio station is causing any undue interference to other wireless telegraphy, the emissions shall be suppressed or reduced, to the satisfaction of the
  - A the person complaining
  - B the Radio Society of Great Britain
  - C the Local Authority
  - D Office of Communications.
  
- 7 Revocation of an amateur licence is likely to occur if
  - A the annual fee is not paid
  - B the amateur's details are not updated at least once per year
  - C the amateur's details are not updated at least once every five years
  - D no transmissions have been made in a two year period.
  
- 8 The Intermediate Licence permits a maximum RF output power at 136kHz of
  - A 1W erp
  - B 32W
  - C 40W erp
  - D 50W
  
- 9 Sending television pictures using frequency modulation requires a bandwidth of over 12MHz. The lowest frequency at which this can be done is in the bands above
  - A 430MHz
  - B 1240MHz
  - C 1270MHz
  - D 24000MHz.

**10** The energy supplied to a secondary cell is stored as

- A a charge of electricity
- B electrical energy
- C chemical energy
- D joules with a potential difference.

**11** If the current through the  $10\Omega$  resistor is 2A, the current through the  $20\Omega$  resistor will be

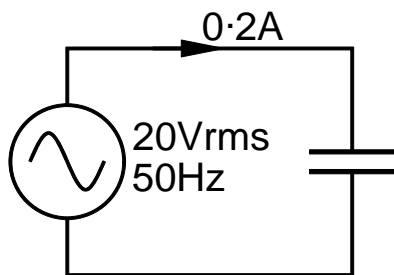


- A 1A
- B 2A
- C 3A
- D 20A

**12** An inductor can store

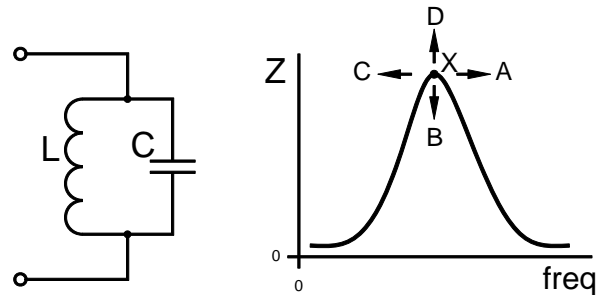
- A henries in an alternating field
- B energy in a magnetic field
- C charge in an electric field
- D amps in a changing field.

**13** An alternating current is flowing in a capacitor as shown in the diagram. The capacitor has



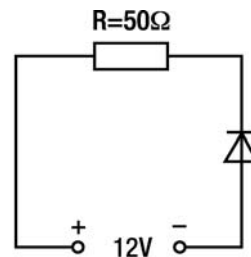
- A a reactance of  $100\Omega$
- B a capacitance of  $250\mu\text{F}$
- C an impedance of  $100\Omega$
- D a resistance of  $1000\Omega$

**14** The drawing shows an LC circuit and its frequency response. If the value of C is increased, the point 'X' on the frequency response graph will then move in which direction?



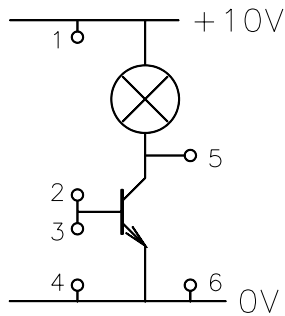
- A Direction A
- B Direction B
- C Direction C
- D Direction D

**15** The current flowing in the resistor will be

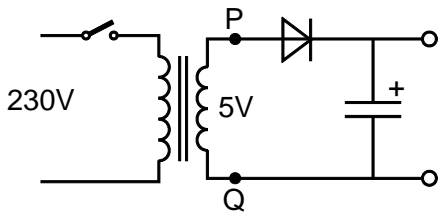


- A 0A
- B 0.24A
- C 0.60A
- D 4.16A

- 16** The 10V bulb in the diagram needs 100mA of current to light. A 1k $\Omega$  resistor can be used to light the bulb if connected

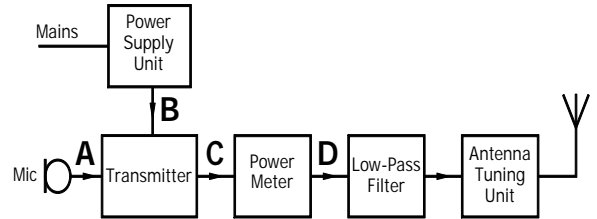


- A between points 1 and 2.  
 B between points 1 and 4.  
 C between points 3 and 4.  
 D between points 5 and 6.
- 17** A multimeter to measure the voltage across points PQ in the diagram should be set to

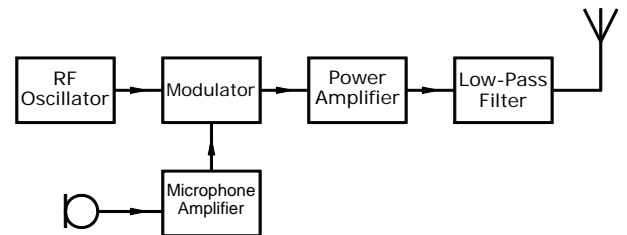


- A 0-10V DC  
 B 0-10A DC  
 C 0-10V AC  
 D 0-10A AC
- 18** A balanced modulator will produce
- A amplitude modulation with suppressed carrier  
 B amplitude modulation with full carrier  
 C single sideband modulation  
 D frequency modulation.
- 19** A carrier wave on 50400kHz is amplitude modulated. The upper sideband is 50402kHz. The lower sideband will be
- A 50396kHz  
 B 50398kHz  
 C 50404kHz  
 D 50406kHz.

- 20** At which point in the block diagram should the audio frequency bandwidth be limited to enable more efficient use of the radio frequency spectrum?



- A point A  
 B point B  
 C point C  
 D point D
- 21** The diagram shows an AM transmitter. The RF oscillator is running at 7.05MHz. The purpose of the low pass filter is to

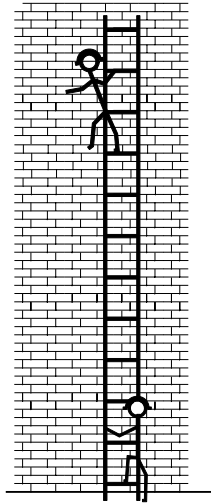


- A remove the lower sideband frequencies  
 B attenuate harmonics  
 C pass the lower sideband frequencies and reject the upper sideband  
 D remove the carrier.
- 22** In a superhet receiver, the bulk of the gain and selectivity is achieved in the
- A RF amplifier  
 B mixer  
 C IF amplifier  
 D audio amplifier.

- 23** The intermediate frequency of a radio receiver is 600kHz. The local oscillator is running at 12MHz. The frequency of the signal received will be
- A 600kHz
  - B 11.4MHz
  - C 12MHz
  - D 12.4MHz
- 24** A product detector is used to
- A indicate the received signal strength
  - B produce an amplitude modulated signal
  - C demodulate an FM transmission
  - D demodulate an SSB transmission.
- 25** In a coaxial cable the field
- A round one conductor is the same as the field round the other
  - B round one conductor is equal and opposite to the field round the other
  - C exists only between the two conductors and stays inside the cable
  - D is present round the cable for a distance of about 10 wavelengths.
- 26** The RF potential difference and current flowing are noted where the feeder is connected to the antenna. These two measurements will give the
- A characteristic impedance of the cable
  - B feed impedance of the antenna
  - C standing wave ratio on the feeder
  - D gain of the antenna.
- 27** An antenna has a driven element and a reflector. There is probably also a
- A director
  - B radial
  - C matching coil
  - D ground plane.
- 28** An amateur has been recording the changes in HF propagation over several years. As well as changes summer to winter, it is noticed there is a progressive change from one summer (or winter) to the next. This is probably due to
- A global warming
  - B changes in the sunspot cycle
  - C reductions in the ozone layer
  - D an increase in transmitter power.
- 29** Snow, ice and very heavy rain can attenuate which frequencies?
- A HF
  - B HF and VHF
  - C LF
  - D UHF and above.
- 30** What will be the overall length of a half-wave dipole for the 70MHz amateur band? The velocity of radio waves may be taken as  $3 \times 10^8$  m/s (300,000,000 m/s)
- A 0.7m
  - B 1.1m
  - C 2.1m
  - D 4.2m
- 31** Which one of the items listed below is most likely to be the source of interference to other domestic appliances?
- A A television.
  - B A mobile phone.
  - C A DVD player.
  - D A cassette recorder.
- 32** A transmitter can be checked for harmonics and spurious signals by using
- A a general coverage radio receiver
  - B a sensitive power meter
  - C an absorption wavemeter
  - D a frequency counter.

- 33** A digital television receiver is suffering from interference from a nearby amateur FM transmission. The screen is likely to
- A show a wavy herringbone effect over the picture
  - B have lots of white spots in a band across the screen
  - C change colour markedly
  - D freeze or break up into small squares.
- 34** An investigation of interference to a television has shown that the RF is getting into the TV either by the RF being picked up on the TV mains lead or by being conducted along the mains cables all the way from the transmitter. To find out which, the amateur should
- A fit a ferrite ring on the TV mains lead
  - B fit a ferrite ring on the TV aerial down-lead
  - C transmit into a dummy load
  - D reduce the transmitter power.
- 35** If a neighbour complains of interference from an amateur's transmitter, the amateur should
- A refuse to help and continue transmitting
  - B apologise and only transmit when the neighbour is out
  - C offer to help by doing some tests
  - D send times and frequencies to the RSGB.
- 36** On replying to a CW CQ call the response received is 'QRZ'. This means
- A someone else has already replied
  - B a very strong signal
  - C is the frequency clear?
  - D who is calling me?
- 37** Fast scan television is not practicable in the 20m band because
- A it is not in the Band Plan
  - B interference would be caused to overseas amateurs
  - C the bandwidth at 14MHz is insufficient
  - D the licence does not permit visual images of non-licensed people to be transmitted.
- 38** When calling CQ a reply is received from an amateur giving the call VK3ABC. The amateur is located in
- A ☐ France
  - B ☐ Canada
  - C ☐ the Netherlands
  - D ☐ Australia.
- 39** One feature of satellite communication is that
- A transmit and receive are normally 600kHz apart in frequency
  - B the received frequency appears to drift quite widely
  - C contact is available 24 hours a day
  - D a sub-audible tone (CTCSS) is needed to maintain contact.
- 40** The main reason to use a soldering iron stand is to
- A keep the work area clean and tidy
  - B minimise soldering fumes
  - C reduce the risk of burns
  - D reduce the risk of solder flux splashes.
- 41** The best reason for using hand tools in the way they were intended is to
- A reduce the chance of injury
  - B prolong the life of the tool
  - C reduce the amount of swarf or dust created
  - D speed up the work.

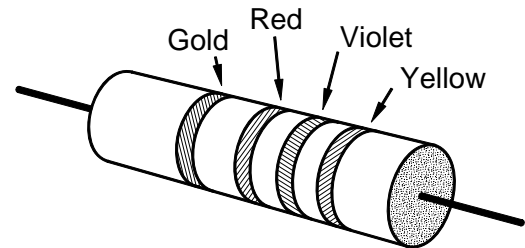
- 42** The action that should be taken in the drawing is to
- A tie the ladder at the top
  - B support the ladder underneath the person on it
  - C come down and move the ladder
  - D place the free foot on the wall rather than let it swing.



- 43** A table lamp is rated at 60W. A suitable fuse in its mains plug would be
- A [ ] 13A
  - B [ ] 7A
  - C [ ] 5A
  - D [ ] 3A

- 44** Many construction faults are caused by
- A wiping the flux off after the job has cooled
  - B heating the joint rather than the solder
  - C wet joints
  - D dry joints.

- 45** What value COULD this resistor have?



- A 472Ω
- B 4700Ω
- C 27000Ω
- D 270kΩ

### Answer key

1	2	3	4	5	6	7	8	9
C	C	A	B	C	D	C	A	B
10	11	12	13	14	15	16	17	18
C	A	B	A	C	A	A	C	A
19	20	21	22	23	24	25	26	27
B	A	B	C	B	D	C	B	A
28	29	30	31	32	33	34	35	36
B	D	C	B	A	D	C	C	D
37	38	39	40	41	42	43	44	45
C	D	B	C	A	C	D	D	B