City & Guilds
Multiple choice question paper

Paper number	Examination	Monday
7650-010	**Radio Amateurs**	**10 May 1999**
Series	Paper	18 30 - 20 45
May 1999	**Written**	**2¼ hours**

You should have the following for this examination

this question paper
an answer sheet
a pen with black or blue ink

You may refer to the attached Schedule to help in answering any of the questions.

MC

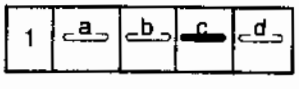
This question paper is the property of The City and Guilds of London Institute and is to be returned after the examination.

Read the following notes BEFORE you answer any questions.

- You must use a pen with black or blue ink to complete ALL parts of the answer sheet.
- Check that you have the correct answer sheet.
- Print your name in the box provided on the answer sheet.
- Each question shows FOUR possible answers (lettered 'a', 'b', 'c' and 'd'), only ONE is correct.

  Decide which ONE is correct and mark your ANSWER SHEET with your PEN.

  For example if you decide 'c' is correct, mark your answer like this



  If you want to change your answer, cancel your first choice by filling in the lower half of the box like this 
  Then mark the answer which you have now decided is correct.

- Any calculations or rough work can be done in this question paper.
- Attempt all questions; if you find a question difficult, leave it and return to it later.

This paper contains 80 questions; answer them using the 'boxes' numbered 1 to 80 on the answer sheet.

See next page

1 One of the qualifications required for an Amateur Radio Licence (A) is that the applicant must

a be over 16 years of age
b have paid the fees for the Radio Amateurs Examination
c have passed the Morse Test
d have applied to take the Morse Test.

2 Which one of the following designates a class of licence issued by the Secretary of State for amateur radio transmission?

a P.
b CB.
c B.
d M.

3 In the 'Amateur Radio Licence (A) or (B) Terms, Provisions and Limitations Booklet BR68', wireless telegraphy means

a any permitted type of transmission
b Morse and data only
c Morse, RTTY, data, facsimile, SSTV only
d all types of transmission except telephony.

4 In the conditions of use of an Amateur Radio Licence 'Temporary Location' means

a the address as set out in the Validation Document
b a location other than the Main Station Address, in the Utiited Kingdom, and in a fixed position
c a location in the United Kingdom in a vehicle or as a pedestrian
d a location on any vessel at sea or in inland waters.

5 Which one of the following is a club call sign?

a GD1XYZ.
b GM1XYZ.
c GS1XYZ.
d GU1XYZ.

6 The essential requirement for a Log Book is that it must

a have no fewer than 20 pages
b be obtained from the RSGB
c be loose-leaf
d not be loose-leaf.

7 Certain amateur h.f. bands may be used for communication in times of

a breakdown of the international public correspondence services
b international disaster communications
c propagation difficnlties with the maritime mobile service
d propagation difficulties with the aeronautical service.

8 The licensee may use the station for non-pecuniary activities on behalf of a

a registered political organisation
b non-profit making organisation for the furtherance of amateur radio
c religious organisation
d profit making social organisation.

9 The holder of an Amateur Radio Licence (A) may allow the station to be operated, under his/her supervision, by

a a representative of the Radiocommunications Agency
b an officer of the Radio Investigation Service
c the holder of an amateur radio licence from any country
d a Citizen's Band licence holder.

10 In which one of the following may the holder of an Amateur Radio Licence (A) or (B) operate?

a Any country which is a member of the International Telecommunication Union.
b A country which has implemented CEPT Recommendation T/R 61-01.
c Only those countries which are members of the European Community.
d Only those countries which are members of tbe British Commonwealth.

11 The Licensee shall permit a person authorised by the Secretary of State to have access to the Station and to carry out an inspection for the purpose of verifying

a that the station has been operated during the preceding 12 months
b that the station has been operated during the preceding 6 months
c the Licensee has signed every Log entry
d compliance with the terms of the Licence.

12 The Amateur Radio Licence states that the licensee shall test his transmissions for radiation of harmonics and other spurious emissions and record such tests in the log

a once a month
b once every three months
c at the request of an officer of the Department of Trade and Industry
d from time to time.

13 Which one of the following suffixes must be used by the licensee when the station is operated mobile?

a /M.
b /MA.
c /MM.
d /P.

14 The licensee may send

a broadcast messages for general reception by other amateurs
b recorded material such as music or speeches
c signals (not enciphered) which form part of, or relate to, the transmission of messages
d enciphered signals which form part of, or relate to, the transmission of messages.

15 To which one of the following countries may greetings messages be sent by non-licensed persons if a licence is held on behalf of a club?

a Bermuda.
b Cyprus.
c Canary Islands.
d Falkland Islands.

16 The Regional Secondary Locator M refers to

a Scotland
b Wales
c Isle of Man
d England.

17 In which one of the following wavebands is there a low power segment?

a 80 metres.
b 30 metres.
c 6 metres.
d 2 metres.

18 Which one of the following frequencies is outside an authorised amateur band?

a 51.00 MHz.
b 144.17 MHz.
c 432.29 MHz.
d 1370.77 MHz.

19 The holder of an Amateur Radio Licence A is operating from temporary premises in Wales. Which one of the following must be used to identify the station?

a G2ZZZ/A and the location.
b GW2ZZZ/A and the address of the temporary premises.
c GM2ZZZ/A and the temporary address.
d GW2ZZZ/P and the location.

20 When operating an amateur transmitting station, except during automatic operations involving digital communications, a log must be kept indicating call signs of stations with which communications have been established. Other information which must be recorded includes

a received signal strength
b initials of the Licensee
c CQ calls
d direction of antenna.

21 To minimise the power requirements of a satellite transponder, the preferred method of modulation is

a frequency modulation
b radio teleprinter (RTTY)
c single sidehand
d television.

22 The abbreviation RST means

a Radio Selectivity Test
b Readability, Signal Strength, Tone
c Receiving Standard Transmission
d Radio Standard Time.

23 Band planning

a is a Licence requirement
b minimises interference between different modes
c is only applicable above 30 MHz
d is only applicable below 30 MHz.

24 The phonetic alphabet as set out in the Licence

a gives some protection from interception by third parties
b is compulsory
c must be confined to the words set out in the Licence
d should be used by the licensee.

25 In the interest of safety in the station an isolator switch should be installed. The MOST important feature is that the switch

a should be painted red and illuminated
b should be illuminated with the word DANGER above it
c must have its function and position known by all members of the household
d must be mounted high enough to be out of reach of children.

See next page

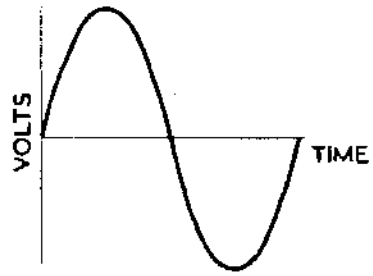


FIG. 1

26 Fig. 1 shows a sine wave. The root mean square (r.m.s.) value of the voltage is

a 0.636 of the maximum value
b the same as the mean value
c the square root of the maximum value
d 0.707 of the maximum value.

27 Which one of the following functions CANNOT be carried out by a power transformer?

a Change a given supply voltage to one of a higher value.
b Change a given supply voltage to one of a lower value.
c Supply a given current to a load current whose impedance differs greatly from that of the source of supply.
d Provide a higher power output from a low-power source of supply.

28 A transmitter has an output power of 50 W. This is equivalent to

a 0 dBW
b 7 dBW
c 17 dBW
d 20 dBW.

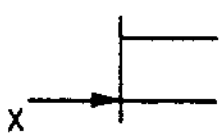


FIG. 2

29 In the FET symbol Fig. 2, the connection marked X is the

a drain
b anode
c gate
d source.

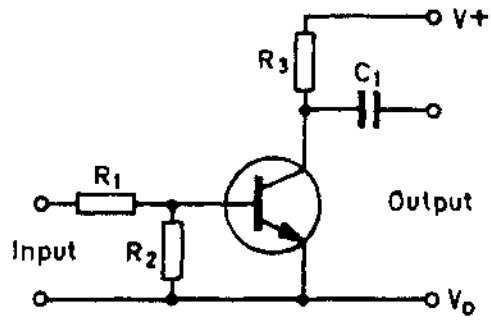


FIG. 3

30 Refer to Fig. 3 which shows a typical transistor switching circuit. The purpose of R_2 is to

a provide base bias
b keep the transistor switched-off when no input signal is present
c prevent self-oscillation when a signal is present
d provide some amplification.

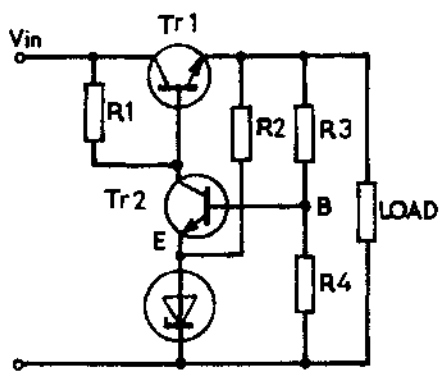


FIG. 4

31 In Fig. 4, transistor Tr1 is connected as a

a common-collector amplifier
b voltage regulator
c common-base amplifier
d power amplifier.

32 Which control should be adjusted to prevent a strong signal overloading the first stages of a receiver?

a AF gain.
b BFO.
c RF gain.
d Squelch.

33 A communications receiver has an intermediate frequency of 1.6 MHz. When using the receiver on 7.05 MHz strong interference is caused by a broadcast station operating on 10.25 MHz. The interference is likely to be caused by

a poor image frequency rejection
b cross modulation
c breakthrough
d harmonic radiation.

34 When used for the reception of A1A signals the b.f.o. in a superhet receiver is

a switched off
b tuned to near the local oscillator frequency
c tuned to near the intermediate frequency
d tuned to an audio frequency.

35 An incoming signal suddenly increases in signal strength. The automatic gain control of a receiver will

a reduce the amplification of the receiver
b increase the amplification of the receiver
c produce positive feedback in the audio output stage
d increase the i.f. bandwidth.

36 A frequency synthesiser provides an output of 144 - 146 MHz. If the phase-locked loop is out of lock it means that

a there will be a high v.s.w.r.
b excessive output will be produced
c the transmitted frequency will be exactly 145.500 MHz
d the transmitted frequency will be uncontrolled.

37 The purpose of a buffer stage in a transmitter is to

a provide ample power to drive the power amplifier stage
b isolate the oscillator stage from stages requiring drive power
c protect the driver stage from over modulation
d provide the major part of amplification of the modulated power.

38 Too large an audio signal applied to a frequency modulated transmitter causes

a radiation of harmonics
b excessively wide sidebands
c overheating of the power amplifier
d production of parasitic oscillations.

39 A dummy load for use when testing a transmitter should be

a resonant at the frequency under test
b inductively reactive with an impedance equal to that of the antenna system to be used
c inductively reactive with an impedance equal to the output of the transmitter under test
d non-reactive with a resistance equal to the output impedance of the transmitter under test.

40 The most serious consequence of an unstable carrier would be that the

a receiving station would have difficulty receiving the signal
b transmissions could interfere with television receivers
c transmissions could interfere with other amateurs
d transmission could move outside the authorised band.

41 Spurious emissions from the output stage of a single sideband transmitter can be caused by

a non-linearity of the output stage
b an unstablised power supply
c an untuned collector circuit
d the transistor not having a heat sink.

42 The radiation of harmonics from an amateur transmitter may be caused by

a the power amplifier stage being over-driven
b keying a high current circuit in the transmitter
c the power supply to the driver stage being unregulated
d r.f. being induced in the mains supply to the transmitter.

43 Which one of the following has the greatest effect on the total bandwidth occupied by a Morse transmission?

a Type of key used.
b Keying speed.
c Keying waveform.
d Transmitter power.

44 Transmitter outputs at two or three times the wanted frequency are called

a harmonics
b key clicks
c splatter
d spurious oscillations.

45 The SUREST way of detecting the presence of parasitic oscillations is by

a tuning through the bands on a television receiver
b using a receiver covering h.f., v.h.f. and u.h.f. frequencies
c tuning a receiver through the amateur band to which the transmitter is tuned
d tuning an f.m. receiver through the 80-100 MHz band.

See next page

46 Which one of the following types of spurious signals which can be heard on a receiver, is caused by poor receiver design?

a Parasitic oscillation.
b Chirps.
c Sideband splatter.
d Second channel interference.

47 Overmodulation is undesirable because it

a reduces transmitter output power
b causes the power amplifier to exceed its maximum ratings
c results in the generation of spurious sidebands
d causes the signal to have a narrower bandwidth.

48 The radiation of harmonics by an h.f. transmitter can be minimised by the

a use of a low pass radio frequency filter at the output of the transmitter
b introduction of small parallel combinations of inductance and resistance very close to the affected transistor
c use of a high pass filter in the power amplifier stage of the transmitter
d neutralising of the power amplifier stage.

49 Which one of the following materials is used to screen unwanted radiation from transmitter r.f. stages?

a Lead.
b PTFE.
c Ferrite.
d Aluminium.

50 Key clicks radiated by a transmitter may be reduced by

a correct biasing of the p.a.
b fitting ferrite beads on the Morse key leads
c slowing rise and fall times of the keyed envelope
d using a low pass filter.

51 Which one of the following classes of amplification is most likely to produce harmonics when used in the p.a. stage of a transmitter?

a Class A.
b Class AB.
c Class B.
d Class C.

52 When using a crystal calibrator in conjunction with a receiver to ensure that a transmitter is operating within the limits of the 28.0 to 29.7 MHz band, the frequency of the crystal should be

a 10 kHz
b 100 kHz
c 500 kHz
d 1000 kHz.

53 Which one of the following may be used to measure accurately the frequency of a home-built transmitter that covers the whole of the 3.5 to 3.8 MHz band?

a SWR meter.
b Digital frequency meter.
c Absorption-type frequency meter.
d Dip oscillator.

54 Which one of the following actions is most likely to cause interference to electronic equipment?

a Operating with the minimum power to maintain contact.
b Using frequency modulation in preference to s.s.b.
c Using coaxial cable to the antenna which is located as far from the electronic equipment as possible.
d Using a whip antenna indoors.

55 An amateur operator should

a only use class C linear amplifiers at their maximum rated power for s.s.b. operation
b maintain power levels at approximately 35 dBW in urban areas
c use full legal power at all times
d use only the power necessary to maintain reliable communication.

56 The arcing contacts of a faulty thermostat

a can cause interference over a wide frequency band
b will always cause interference over a narrow frequency band
c cause interference on a single frequency only
d may be cured by replacing the thermostat with a silicon diode.

57 Which one of the following items, will generate a single, narrow band signal?

a Station transmitter.
b Scanning receiver.
c Station computer.
d Station analogue multimeter.

58 A neighbour's television receiver is observed to suffer loss of colour, poor synchronisation of the picture and patterning on all TV channels when an amateur transmits nearby on 18.1 MHz. The problem is most likely to be caused by

a i.f. breakthrough
b audio breakthrough
c cross modulation of r.f. stages
d radiation via the main supply.

59 TV receiver blocking or desensitising is caused by

a lowering the antenna height
b maladjustment of the volume control
c adjusting squelch or mute control incorrectly
d interfering strong r.f. signals.

60 The function of a ferrite ring used to reduce radio frequency interference entering an audio amplifier via the speaker connecting leads is to

a increase the impedance of the speaker leads at audio frequencies
b trap the interfering signals in circulating currents within the ring
c minimise the distortion of the audio frequencies
d increase the impedance to r.f. currents flowing in the speaker leads.

61 An audio amplifier is experiencing break-through from a two metre amateur transmission. Which capacitor would be a suitable r.f. decoupling component?

a 100 μF electrolytic.
b 10 μF tantalum.
c 1000 pF ceramic.
d 0.5 pF silver mica.

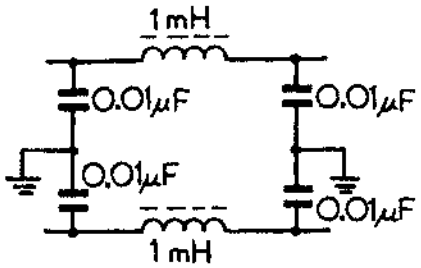


FIG. 5

62 Fig. 5 shows the circuit of a device which may be connected in the mains supply to a transmitter. Its use is to

a reduce the presence of harmonics radiated
b prevent mains borne interference affecting the operation of the transmitter
c prevent r.f. energy from the transmitter entering the public mains supply
d prevent mains hum being present on the modulation of an a.m. transmitter.

63 A pi-network is a

a high-pass filter
b low-pass filter
c band-pass filter
d band-stop filter.

64 An amateur station contacts distant stations to the west. The only neighbour is on the east side of the station. Which one of the following transmitting antennas will minimise the risk of interference to the neighbour?

a Vertical dipole.
b Horizontal dipole.
c Yagi.
d Long wire.

65 The bandwidth of a speech transmission should be kept as narrow as possible in order to

a maintain good speech quality
b cause a minimum of interference
c reduce high voltage transients in the p.a. stage
d help reduce distortion by the demodulator in the receiver.

66 When an amateur receives a complaint of causing interference to a neighbour's television set, which of the following is the best course of action for the amateur?

a Tell the neighbour that the television set is at fault.
b Refer the problem to a television dealer.
c Discuss a possible remedy with the neighbour.
d Refer complainant to the RIS.

See next page

67 A transmitter installed in a car should be located

a at least one metre from the battery
b as close to the wiring loom as possible
c away from any of the car's electronic units
d as close to the airbag as possible.

68 A transmitted wave is vertically polarised when

a its magnetic component is vertical
b the antenna is pointing north in the northern hemisphere
c the antenna is parallel to the ground
d its electrical component is vertical.

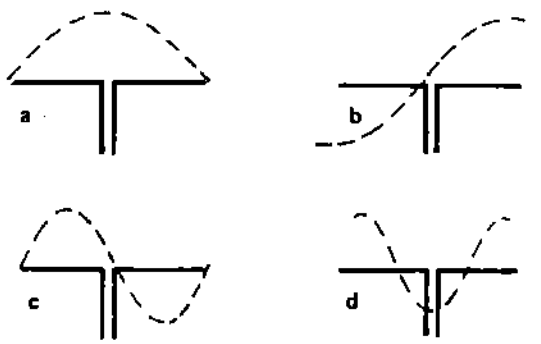
69 At night, ionospheric propagation in the frequency range 3 MHz to 30 MHz is usually achieved by means of

a the F layer
b recombination of ions
c the D layer
d sporadic-E reflection.

70 The most common cause of fading in the h.f. bands is

a variation in transmitter output power
b attenuation of the ground wave
c signals arriving by different paths
d misalignment of a directional transmitting antenna.

71 Which one of the following shows the current distribution in a half wavelength dipole antenna?



72 A horizontal half wave dipole for the 18 MHz band is 10 metres above ground.
The impedance at the centre is approximately

a 35 Ω
b 70 Ω
c 150 Ω
d 300 Ω.

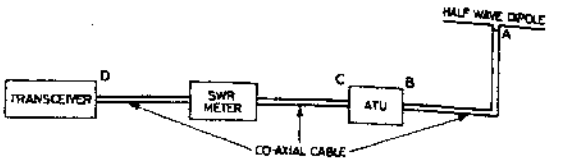


FIG. 6

73 Refer to Fig. 6. At which point should a balun be fitted?

a A.
b B.
c C.
d D.

74 The characteristic impedance of balanced feeder, spaced 150 mm, is approximately

a 8 Ω
b 50 Ω
c 75 Ω
d 600 Ω.

75 A voltmeter suitable for measuring the base voltage of a transistor must

a be battery operated
b have a low resistance
c have a high resistance
d contain a moving-coil indicator.

76 The d.c. input to the final amplifier of an h.f. transmitter is 1.5 A at 30 V. If the stage is operated in Class C and is carefully matched to the output load, a reasonable output power would be about

a 45 W
b 30 W
c 20 W
d 15 W.

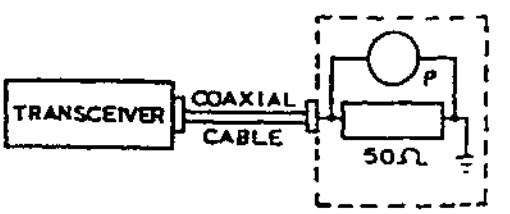


FIG. 7

77 Fig. 7 shows a dummy load connected to a transceiver. Which one of the following would be suitable for P?

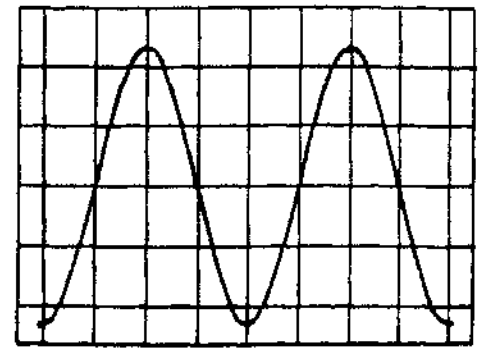
a r.f. ammeter.
b d.c. ammeter.
c r.f. voltmeter.
d d.c. voltmeter.

78 When checked against the standard Frequency Service transmission on 20 MHz, the digital read-out of a transceiver indicates 19.998 MHz. If the transceiver is to be operated 5 kHz above the low frequency end of the 18 MHz band, what must appear on the digital read-out?

a 18.063 MHz.
b 18.071 MHz.
c 18.073 MHz.
d 18.075 MHz.

79 A 50 Ω dummy load for use with a 3 W transmitter may be constructed using

a a single 50 Ω 3 W rated wirewound resistor
b three 50 Ω 1 W rated carbon resistors connected in parallel
c three 50 Ω 1 W rated carbon resistors connected in series
d three 150 Ω 1 W rated carbon resistors connected in parallel.



Graticule of CRO is marked in 1 cm squares

FIG. 8

80 A sinewave is displayed on the screen of an oscilloscope as shown in Fig. 8. If the timebase is set to give a sweep of 200 µs/cm what is the frequency of the waveform?

a 1250 Hz.
b 2500 Hz.
c 5000 Hz.
d 12 500 Hz.

NOW GO BACK AND CHECK YOUR WORK

● IMPORTANT —

Have you printed your name in INK in the appropriate box on the answer sheet?

Have you filled in your answers in INK in the appropriate boxes on the answer sheet?

