

CARS Advanced Course Mock Examination

This paper consists of 62 questions, Duration 120 minutes.

INSTRUCTIONS TO CANDIDATES

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' A [] A [✓]

B [] B []

If you change your mind, shade out the tick and tick the box for your new choice. C [✓] C [v]

D [] D []

The Schedule to the licence and the Formula Sheet 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 check the details below before the start.

Family Name:	
First names:	
Date of birth:	
Candidate Number:	
Test centre location:	EX144 - Danbury Village Hall
Date of Test:	

CARS Advanced Course - Mock Examination

- 1/ Which is NOT licensed for Amateur use
- A ☐ 5650 – 5670 GHz
 - B ☐ 5765 – 5820 GHz
 - C ☐ 5820 – 5830 GHz
 - D ☐ 5830 – 5850 GHz
- 2/ I am transmitting on 1.851 MHz maximum pep power shall be set to
- A ☐ 32 dBW
 - B ☐ 15 dBW
 - C ☐ 26 dBW
 - D ☐ 16 dBW
- 3/ For advice on radio frequency emission safety you should contact
- A ☐ RSGB
 - B ☐ Ofcom
 - C ☐ The health protection agency
 - D ☐ Local primary care trust
- 4/ You may not use your station for disaster communications,
- A ☐ When approached by a member of the public.
 - B ☐ When approached by a member of the Health authority.
 - C ☐ When approached by a member of the police.
 - D ☐ When approached by a member of the fire service.
- 5/ What is a recognised training course
- A ☐ A club run course
 - B ☐ An RSGB course
 - C ☐ A course recognised by or on behalf of OFCOM
 - D ☐ A college course
- 6/ On the 21st June you have a QSO with a VK station on 14 MHz at 8 AM UK local time. What time would you record on the QSL card?
- A ☐ 0700
 - B ☐ 0800
 - C ☐ 0900
 - D ☐ 2000
- 7/ If an authorised officer demands orally that you close down when should you comply?
- A ☐ After 28 days
 - B ☐ After receiving the instruction in writing
 - C ☐ Immediately
 - D ☐ When you renew your licence.

- 8/ When operating an unattended radio beacon, the licensee must
A [] be able to switch it off immediately
B [] give 7 days notice of operation to OFCOM
C [] be able to switch off in two hours
D [] only use pulse transmission
- 9/ For remote operation which band of frequencies should not be used
A [] 51.00 to 52.00 MHz
B [] 29.00 to 29.7 MHz
C [] 28.00 to 29.00 MHz
D [] 10.1 to 10.15 MHz
- 10/ When operating /MM you should close down
A [] When contacted by a coast station
B [] During silence periods
C [] By order of the vessels Master.
D [] When requested by a passenger.
- 11/ Three resistor are connected in parallel of values 12 kOhms, 6 kOhms and 18 kOhms, the total resistance is
A [] 32.7 kOhms
B [] 3.27 kOhms
C [] 7.2 kOhms
D [] 9 kOhms
- 12/ A 400pF and a 1600pF capacitor are connected in series the total capacitance is;
A [] 160pF
B [] 2000pF
C [] 1200pF
D [] 320pF
- 13/ If the spacing distance between the turns of an inductor is doubled does the inductance;
A [] Increase
B [] Decrease
C [] Double in value
D [] Has no effect
- 14/ The RMS value of a sine wave is;
A [] 0.707 of peak voltage
B [] 0.637 of peak voltage
C [] 1.414 of peak voltage
D [] 0.5 of peak voltage

15/ What is the phase relationship between the voltage and the current in a capacitor?

- A [] The voltage lags the current.
- B [] The current lags the voltage
- C [] Both in phase
- D [] Voltage and current 180 degrees out of phase.

16/ An inductor of $25.5 \mu\text{H}$ is connected in series with a capacitor of 20 pF , what is the approximate resonant frequency.

- A [] 14 MHz
- B [] 7 MHz
- C [] 14 kHz
- D [] 700 kHz

17/ The input impedance of a transformer is 50 Ohms and the output impedance is 200 Ohms. What is the turns ratio input to output of the transformer?

- A [] 1 : 2
- B [] 1 : 8
- C [] 4 : 1
- D [] 1 : 4

18/

Amplitude



The drawing shows a;

- A [] Band Stop filter.
- B [] Low pass filter.
- C [] High pass filter
- D [] Band pass filter.

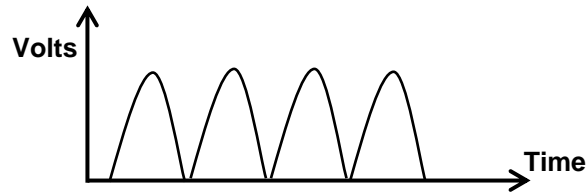
19/ To reduce the unwanted radiation from an oscillator into other stages of a receiver you would fit;

- A [] Ferrite beads
- B [] Decoupling capacitors
- C [] A metal screen
- D [] An inductor.

20/ In a semiconductor the boundary between the N and P type material is known as;

- A [] The depletion layer
- B [] Point barrier
- C [] Screen layer
- D [] Breakdown region.

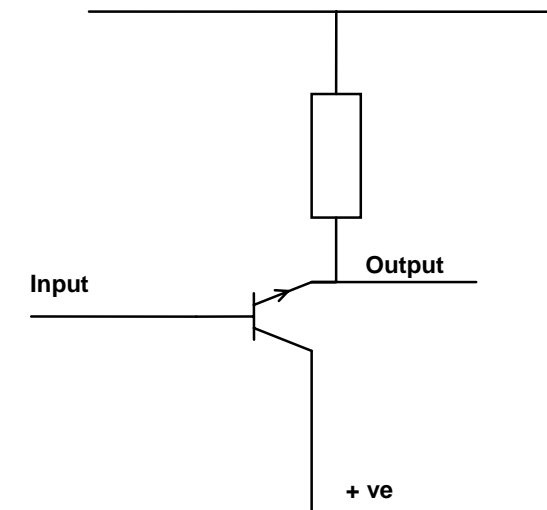
21/



The above waveform is the output from a;

- A [] A high pass filter
- B [] Low pass filter
- C [] Half wave rectifier
- D [] Full wave rectifier.

22/



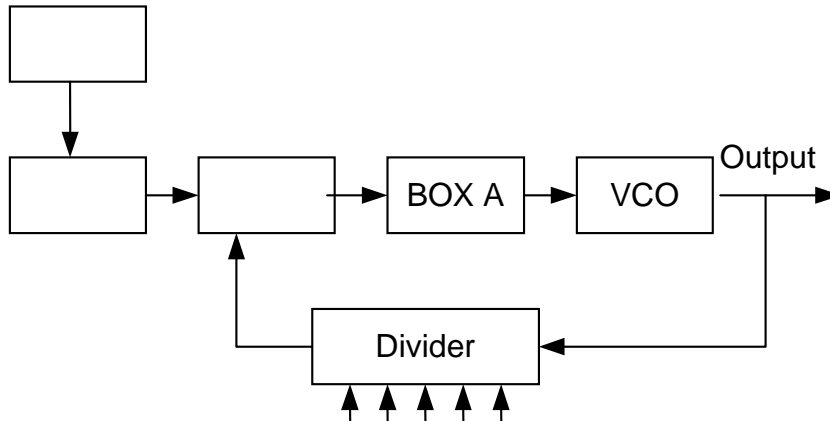
The above circuit represents a;

- A [] An emitter follower
- B [] A common base amplifier
- C [] A mixer amplifier
- D [] A common emitter amplifier.

- 23/ To produce an output at 145 MHz a transmitter mixes to oscillator outputs of 110 MHz and 35 MHz. As well as the wanted output there is an unwanted output of:

A [] 95 MHz
 B [] 75 MHz
 C [] 85 MHz
 D [] 70 MHz

24/



The above drawing is a frequency synthesiser, with some stages marked. What is box A?

A [] Phase comparator
 B [] Crystal oscillator
 C [] Low pass filter
 D [] Divider

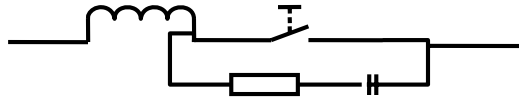
- 25/ To receive a FM signal on VHF the bandwidth of the receiver should be;

A [] 300Hz
 B [] 10 – 16 kHz
 C [] 2.5 –3.0 kHz
 D [] 75kHz

- 26/ Which type of modulation requires a linear amplifier?

A [] SSB
 B [] FM
 C [] Phase
 D [] CW

27/



The circuit shown is;

- A [] A low pass filter
- B [] A key click filter.
- C [] A CW oscillator
- D [] A timing circuit.

28/

Parasitic oscillation may be caused by self resonance of;

- A [] Non inductive Resistor.
- B [] A diode.
- C [] A transistor.
- D [] An RF inductor.

29/

Which is a consequence of over driving a linear amplifier?

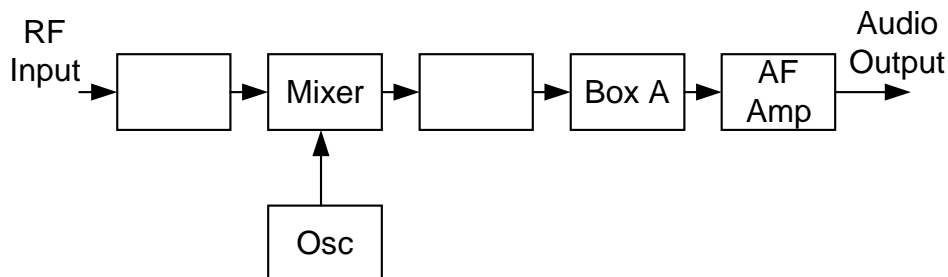
- A [] The signal is difficult copy.
- B [] The signal is attenuated.
- C [] The signal occupies more bandwidth than necessary.
- D [] The amplifier will fail.

30/

The Dynamic range of a receiver is;

- A [] The signal to noise ratio
- B [] The difference between the minimum signal and the onset of overloading
- C [] The difference in output between minimum and maximum audio.
- D [] The gain of the IF stage.

31/



The partially completed block diagram above is of a superhet, what label should be in block A?

- A [] Detector
- B [] IF Amplifier
- C [] RF Amplifier
- D [] AGC Amplifier

32/

Another name for second channel interference is;

- A [] Blocking
- B [] Image frequency
- C [] Co Channel interference
- D [] Spurious response.

33/ In a double superhet receiver, the use of a high first IF is;

- A [] To optimise adjacent channel interference..
- B [] To reduce problems with the image frequency.
- C [] Easier to constructed.
- D [] Easier to receive FM transmissions.

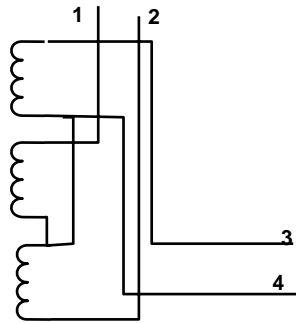
34/ In a superhet receiver, automatic gain control is provided to;

- A [] To enable operators to receive music.
- B [] To copy CW transmissions
- C [] To minimise the effects of fading.
- D [] To provide a stable voltage to the local oscillator.

35/ To receive 430MHz band transmissions on a 2 metre receiver you require;

- A [] A Down converter
- B [] An Up converter.
- C [] A Transverter
- D [] A wide band amplifier.

36/



The balance line is connected to the following connections;

- A [] 2 & 3
- B [] 1 & 2
- C [] 2 & 4
- D [] 3 & 4

37/ The overall length of a practical half wave dipole for 21.2 MHz when mounted at the correct height is;

- A [] 14.15 metres
- B [] 7.075 metres
- C [] 6.721 metres
- D [] 7.500 metres

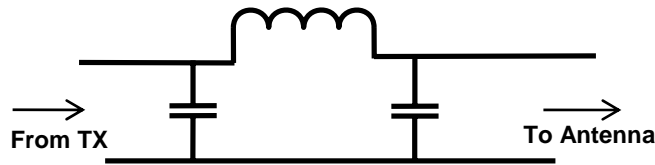
38/ In a trap dipole, the trap consists of ;

- A [] A Capacitor
- B [] An Inductor
- C [] A series tuned circuit of capacitance and inductance.
- D [] A parallel tuned circuit of capacitance and inductance.

39/ You measure on your feeder system a forward power of 100 watts and a reflected power of 5 watts. What is the return loss.

- A [] +13 dB
- B [] -26 dB
- C [] -13 dB
- D [] +26 dB

40/



The above circuit is of an Antenna Matching Unit, the circuit is known as;

- A [] A T match
- B [] A series match
- C [] A Pi match
- D [] An L match

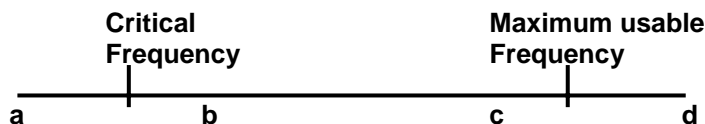
41/ The electromagnetic wave consists of;

- A [] Radio waves
- B [] E and H fields
- C [] Polarised fields.
- D [] E and M waves.

42/ The sky wave is the normal propagation mode for ;

- A [] Daytime contacts on top band 160 metres.
- B [] Night time contacts on 28 metres during sunspot minimum.
- C [] Daytime contacts on 15 metres.
- D [] Long distance contact on 2 metres.

43/ Which amateur band is the best for daytime DX?



- A [] c
- B [] a
- C [] b
- D [] d

44/ Your own transmission on 18.134 MHz causes a problem on your TV receiver. You have already fitted ferrite rings to the main's cable and a braid breaker to the antenna down lead. The most likely route into the TV receiver is therefore:

- A [] IF pick up
- B [] Base band pick up.
- C [] Via DVD player
- D [] Passive Intermodulation.

- 45/ You are causing TVI to a neighbours television on 2 metres, he is willing for you to examine the TV system. What is the most likely cause?
- A [] Poor antenna mounting.
 - B [] His down lead.
 - C [] His mast head amplifier.
 - D [] The television
- 46/ Your TV picture consists of two identical images one fainter than the other. This is caused by;
- A [] The TV signal arriving from two different directions.
 - B [] Cross modulation.
 - C [] Overloading of the front end.
 - D [] Blocking.
- 47/ A braid breaker filter is normally installed;
- A [] As close to the TV antenna as possible.
 - B [] As close to the "RF input" of the system as possible.
 - C [] As close to the 13 amp mains as possible.
 - D [] Where it is hidden away.
- 48/ RF ferrite beads are sometimes slipped over legs of transistors to cure;
- A [] To improve stability
 - B [] To provide a DC path.
 - C [] To prevent Parasitic oscillations.
 - D [] To minimise harmonics.
- 49/ You are transmitting an Power of 30 watts and an antenna gain of 3dBd what field strength will you have at the end of your garden 5 metres away?
- A [] 5.4 V/m
 - B [] 10.8 V/m
 - C [] 271 V/m
 - D [] 54 V/m
- 50/ The worst antenna for TVI is;
- A [] A Doublet
 - B [] Monoband Yagi.
 - C [] A long wire.
 - D [] A Dipole.
- 51/ When should carry out tests on your station to prove you are not generating interference.
- A [] From time to time.
 - B [] Only when there is a complaint.
 - C [] When requested by an officer of Ofcom.
 - D [] When instructed by the RSGB.
- 52/ Packet radio requires additional equipment called;
- A [] Store and forward modem.
 - B [] Terminal Node Controller.
 - C [] A Mailbox.
 - D [] PSK Modem.

53/ Normal repeater shift on 2 metre's is;

- A [] 110 Hz
- B [] 700 kHz
- C [] 600 kHz
- D [] 1 MHz

54/ Special event stations shall be;

- A [] Only operated by club members.
- B [] Set up only by radio clubs.
- C [] Restricted to local events.
- D [] Open to viewing by members of the public.

55/ To conform to IARU agreements on which band should we only transmit a CW signal?

- A [] 18.068 – 18.168
- B [] 1.850 - 2.000
- C [] 3.500 – 3.800.
- D [] 10.100 - 10.150

56/ Why should all exposed metal work be earthed?

- A [] For Safety purposes
- B [] To reduce hand capacitance
- C [] For screening purposes
- D [] To protect equipment.

57/ Which one of these is a mobile operators safety hazard.

- A [] The equipment placed on a seat to operate.
- B [] The correct fuse is fitted.
- C [] The power cables are routed correctly
- D [] The operator uses a hand microphone.

58/ A person should not be exposed to a Field Strength in excess of;

- A [] 29 V/m
- B [] 28 V/m
- C [] 10 mW/cm²
- D [] 100 mW/cm²

59/ An analogue meter can be extend to measure high currents by means of a;

- A [] A series capacitor.
- B [] A shunt resistor.
- C [] A parallel diode.
- D [] A series Resistor.

- 60/ To confirm that a wavemeter is accurate, you check against;
- A [] Another wave meter
 - B [] You're own frequency counter.
 - C [] A standard radio frequency transmission.
 - D [] Your oscilloscope.
- 61/ What is the function of the time base control on an oscilloscope?
- A [] Adjust the trace vertically.
 - B [] Attenuate the input signals.
 - C [] Determines the time the spot moves from left to right on the screen.
 - D [] Blanks the spot when it returns to the start position.
- 62/ A measurement taken from an in-line Standing Wave Meter indicates a forward voltage of 6V and a reverse voltage of 4V. The VSWR on the line is;
- A [] 1.5 : 1
 - B [] 1.6 : 1
 - C [] 1.7 : 1
 - D [] 1.8 : 1