

**Elementary Theory of Radio  
Communications (10 Questions)**

**1.** An element which falls somewhere between being an insulator and a conductor is called a:

- a.  P-type conductor
- b.  intrinsic conductor
- c.  semiconductor
- d.  N-type conductor

**2.** The better conductor of electricity is:

- a.  copper
- b.  carbon
- c.  silicon
- d.  aluminium

**3.** An important difference between a common torch battery and a lead acid battery is that only the lead acid battery:

- a.  has two terminals
- b.  contains an electrolyte
- c.  can be re-charged
- d.  can be effectively discharged

**4.** The total resistance of several resistors connected in series is:

- a.  less than the resistance of any one resistor
- b.  greater than the resistance of any one resistor
- c.  equal to the highest resistance present
- d.  equal to the lowest resistance present

**5.** The value of a resistor to drop 100 volt with a current of 0.8 milliampere is:

- a.  125 ohm
- b.  125 kilohm
- c.  1250 ohm
- d.  1.25 kilohm

**6.** The total capacitance of two or more capacitors in series is:

- a.  always less than that of the smallest capacitor
- b.  always greater than that of the largest capacitor
- c.  found by adding each of the capacitances together
- d.  found by adding the capacitances together and dividing by their total number

**7.** A transformer with 100 turns on the primary winding and 10 turns on the secondary winding is connected to 230 volt AC mains. The voltage across the secondary is:

- a.  10 volt
- b.  23 volt
- c.  110 volt
- d.  2300 volt

**8.** If two 10 ohm resistors are connected in series with a 10 volt battery, the battery load is:

- a.  5 watt
- b.  10 watt
- c.  20 watt
- d.  100 watt

**9.** A current of 10 ampere rms at a frequency of 50 Hz flows through a 100 ohm resistor. The power dissipated is:

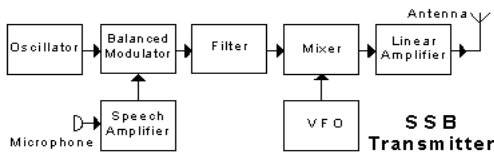
- a.  500 watt
- b.  707 watt
- c.  10,000 watt
- d.  50,000 watt

**10.** A resistor in a circuit becomes very hot and starts to burn. This is because the resistor is dissipating too much:

- a.  current
- b.  voltage
- c.  resistance
- d.  power

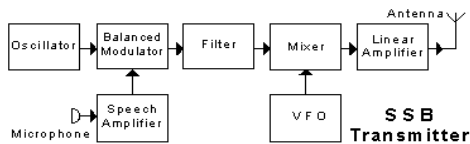
## Transmitters and Receivers (8 Questions)

11. In the transmitter block diagram shown, the "balanced modulator":



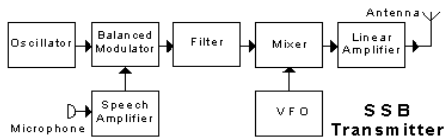
- a.  balances the high and low frequencies in the audio signal
- b.  performs double sideband suppressed carrier modulation
- c.  acts as a tone control
- d.  balances the standing wave ratio

12. In the transmitter block diagram shown, the "filter":



- a.  removes mains hum from the audio signal
- b.  suppresses unwanted harmonics of the RF signal
- c.  removes one sideband from the modulated signal
- d.  removes the carrier component from the modulated signal

13. In the transmitter block diagram shown, the "mixer":

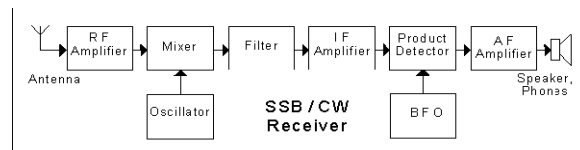


- a.  adds the correct proportion of carrier to the SSB signal
- b.  mixes the audio and RF signals in the correct proportions
- c.  translates the SSB signal to the required frequency
- d.  mixes the two sidebands in the correct proportions

14. Several stations advise that your FM simplex transmission in the "two metre" band is distorted. The cause might be that:

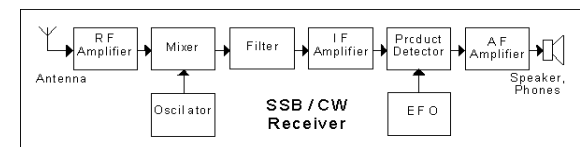
- a.  the transmitter modulation deviation is too high
- b.  your antenna is too low
- c.  the transmitter has become unsynchronised
- d.  your transmitter frequency split is incorrect

15. In the block diagram of the receiver shown, the "RF amplifier":



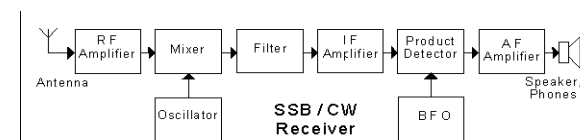
- a.  decreases random fluctuation noise
- b.  is a restoring filter amplifier
- c.  increases the incoming signal level
- d.  changes the signal frequency

16. In the block diagram of the receiver shown, the output frequency of the "oscillator" is:



- a.  the same as that of the incoming received signal
- b.  the same as that of the IF frequency
- c.  different from both the incoming signal and IF frequencies
- d.  at a low audio frequency

17. In the block diagram of the receiver shown, the "filter" rejects:



- a.  AM and RTTY signals
- b.  unwanted mixer outputs
- c.  noise bursts
- d.  broadcast band signals

18. Of two receivers, the one capable of receiving the weakest signal will have:

- a.  an RF gain control
- b.  the least internally-generated noise
- c.  the loudest audio output
- d.  the greatest tuning range

### Feeders and Antennas (7 Questions)

19. The designed output impedance of the antenna socket of most modern transmitters is nominally:

- a.  25 ohm
- b.  50 ohm
- c.  75 ohm
- d.  100 ohm

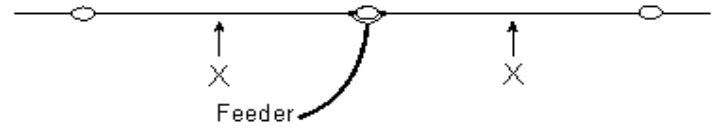
20. If the characteristic impedance of a feedline does not match the antenna input impedance then:

- a.  standing waves are produced in the feedline
- b.  heat is produced at the junction
- c.  the SWR drops to 1:1
- d.  the antenna will not radiate any signal

21. This type of transmission line will exhibit the lowest loss:

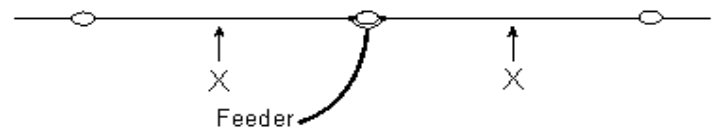
- a.  twisted flex
- b.  coaxial cable
- c.  open-wire feeder
- d.  mains cable

22. The antenna in this diagram can be made to operate on several bands if the following item is installed at the points shown at 'X' in each wire:



- a.  a capacitor
- b.  an inductor
- c.  a fuse
- d.  a parallel-tuned trap

23. The physical length of the antenna shown in this diagram can be shortened and the electrical length maintained, if one of the following items is added at the points shown at 'X' in each wire:



- a.  an inductor
- b.  a capacitor
- c.  an insulator
- d.  a resistor

24. The approximate physical length of a half-wave antenna for a frequency of 1000 kHz is:

- a.  300 metres
- b.  600 metres
- c.  150 metres
- d.  30 metres

**25.** An antenna which transmits equally well in all compass directions is a:

- a.  dipole with a reflector only
- b.  quarterwave grounded vertical
- c.  dipole with director only
- d.  half-wave horizontal dipole

**Propagation (6 Questions)**

**26.** That portion of HF radiation which is directly affected by the surface of the earth is called:

- a.  ionospheric wave
- b.  local field wave
- c.  ground wave
- d.  inverted wave

**27.** Radio wave energy on frequencies below 4 MHz during daylight hours is almost completely absorbed by this ionospheric layer:

- a.  C
- b.  D
- c.  E
- d.  F

**28.** The path radio waves normally follow from a transmitting antenna to a receiving antenna at VHF and higher frequencies is a:

- a.  circular path going north or south from the transmitter
- b.  great circle path
- c.  straight line
- d.  bent path via the ionosphere

**29.** Signal fadeouts resulting from an 'ionospheric storm' or 'sudden ionospheric disturbance' are usually attributed to:

- a.  heating of the ionised layers
- b.  over-use of the signal path
- c.  insufficient transmitted power
- d.  solar flare activity

**30.** The usual effect of ionospheric storms is to:

- a.  increase the maximum usable frequency
- b.  cause a fade-out of sky-wave signals
- c.  produce extreme weather changes
- d.  prevent communications by ground wave

**31.** If the frequency of a transmitted signal is so high that we no longer receive a reflection from the ionosphere, the signal frequency is above the:

- a.  speed of light
- b.  sun spot frequency
- c.  skip distance
- d.  maximum usable frequency

**Measurements (4 Questions)**

**32.** One quarter of one ampere may be written as:

- a.  250 microampere
- b.  0.5 ampere
- c.  0.25 milliampere
- d.  250 milliampere

**33.** The unit for potential difference between two points in a circuit is the:

- a.  ampere
- b.  volt
- c.  ohm
- d.  coulomb

**34.** Impedance is a combination of:

- a.  reactance with reluctance
- b.  resistance with conductance
- c.  resistance with reactance
- d.  reactance with radiation

35. One mA is:

- a.  one millionth of one ampere
- b.  one thousandth of one ampere
- c.  one tenth of one ampere
- d.  one millionth of admittance

**National and International Rules and Operating Procedures:**

**Licensing Conditions (7 Questions)**

36. With the exception of the 0.1357 – 0.1378 the Maximum Peak Envelope Power is measured at:

- a.  the antenna
- b.  the output of the Antenna Matching Unit
- c.  the transmitter output or amplifier
- d.  the input the Power Amplifier

37. The maximum PEP allowed on 20 metres is:

- a.  100W
- b.  200W
- c.  300W
- d.  400W

38. For regulatory purposes the world is divided into regions each with different radio spectrum allocations. Ireland is in:

- a.  Region 1
- b.  Region 2
- c.  Region 3
- d.  Region 4

39. You must keep the following document amateur station:

- a.  your Amateur Radio Licence
- b.  a copy of the ComReg Rules and Regulations
- c.  a copy of the Radio Amateur's Handbook reference
- d.  a chart showing the amateur radio bands

40. An amateur station may transmit unidentified signals:

- a.  when making a brief test not intended for reception by anyone else
- b.  when conducted on a clear frequency when no interference will be caused
- c.  when the meaning of transmitted information must be obscured to preserve secrecy
- d.  never, such transmissions are not permitted

41. You identify your amateur station by transmitting your:

- a.  "handle"
- b.  callsign
- c.  first name and your location
- d.  full name

42. The abbreviation "HF" refers to the radio spectrum between:

- a.  2 MHz and 10 MHz
- b.  3 MHz and 30 MHz
- c.  20 MHz and 200 MHz
- d.  30 MHz and 300 MHz

**National and International Rules and Operating Procedures:**

**Operating Rules and Procedures (8 Questions)**

43. The prefix for Belgium is?

- a.  BE
- b.  BM
- c.  ON
- d.  UM

**44.** The correct order for callsigns in a callsign exchange at the start and end of a transmission is:

- a.  the other callsign followed by your own callsign
- b.  your callsign followed by the other callsign
- c.  your own callsign, repeated twice
- d.  the other callsign, repeated twice

**45.** The accepted way to call "CQ" with a SSB transceiver is:

- a.  "CQ CQ CQ this is EI7XX EI7XX EI7XX"
- b.  "This is EI7XX calling CQ CQ CQ"
- c.  "CQ to anyone, CQ to anyone, I am EI7XX"
- d.  "CQ CQ CQ CQ CQ this is EI Ireland"

**46.** A signal report of "5 and 1" indicates:

- a.  very low intelligibility but good signal strength
- b.  perfect intelligibility but very low signal strength
- c.  perfect intelligibility, high signal strength
- d.  medium intelligibility and signal strength

**47.** The phrase "you are fully quieting the repeater" means:

- a.  your signal is too weak for the repeater to reproduce correctly
- b.  your signal into the repeater is strong enough to be noise free on the output frequency
- c.  your modulation level is too low
- d.  you are speaking too quietly into the microphone.

**52.** A band-pass filter will:

**48.** You are mobile and talking through a VHF repeater. The other station reports that you keep "dropping out". This means:

- a.  your signal is drifting lower in frequency
- b.  your signal does not have enough strength to operate the repeater
- c.  your voice is too low-pitched to be understood
- d.  you are not speaking loudly enough

**49.** The "squelch" or "muting" circuitry on a VHF receiver:

- a.  inhibits the audio output unless a station is being received
- b.  compresses incoming voice signals to make them more intelligible
- c.  reduces audio burst noise due to lightning emissions
- d.  reduces the noise on incoming signals

**50.** The "split frequency" function on a transceiver allows the operator to:

- a.  transmit on one frequency and receive on another
- b.  monitor two frequencies simultaneously using a single loudspeaker
- c.  monitor two frequencies simultaneously using two loudspeakers
- d.  receive CW and SSB signals simultaneously on the same frequency

### **Electromagnetic Compatibility and Transmitter Interference (7 Questions)**

**51.** To reduce harmonic output from a transmitter, the following could be put in the transmission line as close to the transmitter as possible:

- a.  wave trap
- b.  low-pass filter
- c.  high-pass filter
- d.  band reject filter

- a.  pass frequencies each side of a band
- b.  attenuate low frequencies but not high frequencies
- c.  attenuate frequencies each side of a band
- d.  attenuate high frequencies but not low frequencies

**53.** A low-pass filter for a high frequency transmitter output would:

- a.  attenuate frequencies above 30 MHz
- b.  pass audio frequencies below 3 kHz
- c.  attenuate frequencies below 30 MHz
- d.  pass audio frequencies above 3 kHz

**54.** Excessive harmonic output may be produced in a transmitter by:

- a.  a linear amplifier
- b.  a low SWR
- c.  resonant circuits
- d.  overdriven amplifier stages

**55.** Harmonic frequencies are:

- a.  always lower in frequency than the fundamental frequency
- b.  at multiples of the fundamental frequency
- c.  any unwanted frequency above the fundamental frequency
- d.  any frequency causing TVI

**56.** A filter used to attenuate a very narrow band of frequencies centred on 3.6 MHz would be called:

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

**57.** An operational amplifier connected as a filter always utilises:

- a.  positive feedback to reduce oscillation
- b.  negative feedback
- c.  random feedback
- d.  inductors and resistor circuits only

### **Safety (3 Questions)**

**58.** Wires carrying high voltages in a transmitter should be well insulated to avoid:

- a.  short circuits
- b.  overheating
- c.  over modulation
- d.  SWR effects

**59.** A residual current device is recommended for protection in a mains power circuit because it:

- a.  reduces electrical interference from the circuit
- b.  removes power to the circuit when the phase and neutral currents are not equal
- c.  removes power to the circuit when the current in the phase wire equals the current in the earth wire
- d.  limits the power provided to the circuit

**60.** An earth wire should be connected to the metal chassis of a mains-operated power supply to ensure that if a fault develops, the chassis:

- a.  does not develop a high voltage with respect to earth
- b.  does not develop a high voltage with respect to the phase lead
- c.  becomes a conductor to bleed away static charge
- d.  provides a path to ground in case of lightning strikes

