SUBELEMENT T1 – FCC Rules, descriptions and definitions for the Amateur Radio Service, operator and station license responsibilities - [6 Exam Questions - 6 Groups]

T1A - Amateur Radio Service: purpose and permissible use of the Amateur Radio Service; operator/primary station license grant; where FCC rules are codified; basis and purpose of FCC rules; meanings of basic terms used in FCC rules; interference; spectrum management

T1A01 (C) [97.1]
Which of the following is a purpose of the Amateur Radio Service as stated in the FCC rules and regulations?
[redacted]
C. Advancing skills in the technical and communication phases of the radio art
[redacted]
~~

T1A02 (C) [97.1]
Which agency regulates and enforces the rules for the Amateur Radio Service in the United States?
[redacted]
C. The FCC
[redacted]
~~

T1A03 (D)
Which part of the FCC regulations contains the rules governing the Amateur Radio Service?
[redacted]
D. Part 97
~~

T1A04 (C) [97.3(a)(23)]
Which of the following meets the FCC definition of harmful interference?
[redacted]
C. That which seriously degrades, obstructs, or repeatedly interrupts a radio communication service operating in accordance with the Radio Regulations
[redacted]
~~

T1A05 (A) [97.1 (e)]
Which of the following is a purpose of the Amateur Radio Service rules and regulations as defined by the FCC?
A. Enhancing international goodwill
[redacted]
~~

T1A06 (D) [97.101 (d), 97.303 (o)(2)]
Which of the following services are protected from interference by amateur signals under all circumstances?
[redacted]
D. Radionavigation Service
~~

T1A07 (C) [97.3(a)(46)]
What is the FCC Part 97 definition of telemetry?
[redacted]
C. A one-way transmission of measurements at a distance from the measuring instrument
[redacted]
~~

T1A08 (B) [97.3(a)(22)]
Which of the following entities recommends transmit/receive channels and other parameters for auxiliary and repeater stations?
[redacted]
B. Frequency Coordinator
[redacted]
~~

T1A09 (C) [97.3(a)(22)]
Who selects a Frequency Coordinator?
[redacted]
C. Amateur operators in a local or regional area whose stations are eligible to be auxiliary or repeater stations
[redacted]
~~

T1A10 (A) [97.3(a)(5)]
What is the FCC Part 97 definition of an amateur station?
A. A station in the Amateur Radio Service consisting of the apparatus necessary for carrying on radio communications
[redacted]
~~

T1A11 (B) [97.101 (d)]
When is willful interference to other amateur radio stations permitted?
[redacted]
B. At no time
[redacted]
~~

T1A12 (D)
Which of the following is a permissible use of the Amateur Radio Service?
[redacted]
D. Allowing a person to conduct radio experiments and to communicate with other licensed hams around the world
~~

T1A13 (C) [97.3(a)(45)]
What is the FCC Part 97 definition of telecommand?
[redacted]
C. A one-way transmission to initiate, modify or terminate functions of a device at a distance
[redacted]
~~

T1A14 (A) [97.303(d)]
What must you do if you are operating on the 23 cm band and learn that you are interfering with a radiolocation station outside the United States?
A. Stop operating or take steps to eliminate the harmful interference
[redacted]
~~

T1B - Authorized frequencies: frequency allocations; ITU regions; emission modes; restricted sub-bands; spectrum sharing; transmissions near band edges

T1B01 (B)
What is the ITU?
[redacted]
B. A United Nations agency for information and communication technology issues
[redacted]

~~

T1B02 (A) [97.301]
Why are the frequency assignments for some U.S. Territories different from those in the 50 U.S. States?
A. Some U. S. Territories are located in ITU regions other than region 2
[redacted]
~~

T1B03 (B) [97.301(a)]
Which frequency is within the 6 meter band?
[redacted]
B. 52.525 MHz
[redacted]
~~

T1B04 (A) [97.301(a)]
Which amateur band are you using when your station is transmitting on 146.52 MHz?
A. 2 meter band
[redacted]
~~

T1B05 (C) [97.301(a)]
Which 70 cm frequency is authorized to a Technician Class license holder operating in ITU Region 2?
[redacted]
C. 443.350 MHz
[redacted]
~~

T1B06 (B) [97.301(a)]
Which 23 cm frequency is authorized to a Technician Class licensee?
[redacted]
B. 1296 MHz
[redacted]
~~

T1B07 (D) [97.301(a)]
What amateur band are you using if you are transmitting on 223.50 MHz?
[redacted]
D. 1.25 meter band
~~

T1B08 (A) [97.303]
Which of the following is a result of the fact that the amateur service is secondary in some portions of the 70 cm band?
A. U.S. amateurs may find non-amateur stations in the bands, and must avoid interfering with them
[redacted]
~~

T1B09 (D) [97.101(a), 97.301(a-e)]
Why should you not set your transmit frequency to be exactly at the edge of an amateur band or sub-band?
[redacted]
D. All of these choices are correct
~~

T1B10 (C) [97.301(e), 97.305(c)]
Which of the bands above 30 MHz that are available to Technician Class operators have mode-restricted sub-bands?
[redacted]
C. The 6 meter, 2 meter, and 1.25 meter bands
[redacted]
~~

T1B11 (A) [97.301(a), 97.305 (a)(c)]
What emission modes are permitted in the mode-restricted sub-bands at 50.0 to 50.1 MHz and 144.0 to 144.1 MHz?
A. CW only
[redacted]
~~

T1B12 (B) [97.301]
Why are frequency assignments for U.S. stations operating maritime mobile not the same everywhere in the world?
[redacted]
B. Amateur frequency assignments can vary among the three ITU regions
[redacted]
~~

T1B13 (B) [97.305(c)]
Which emission may be used between 219 and 220 MHz?
[redacted]
B. Data
[redacted]
~~

T1C - Operator licensing: operator classes; sequential, special event, and vanity call sign systems; international communications; reciprocal operation; station license and licensee; places where the amateur service is regulated by the FCC; name and address on FCC license database; license term; renewal; grace period

T1C01 (C) [97.3(a)(11)(iii)]
Which type of call sign has a single letter in both its prefix and suffix?
[redacted]
C. Special event
[redacted]
~~

T1C02 (B)
Which of the following is a valid US amateur radio station call sign?
[redacted]
B. W3ABC
[redacted]
~~

T1C03 (A) [97.117]
What types of international communications are permitted by an FCC-licensed amateur station?
A. Communications incidental to the purposes of the amateur service and remarks of a personal character
[redacted]
~~

T1C04 (A) [97.107]
When are you allowed to operate your amateur station in a foreign country?
A. When the foreign country authorizes it
[redacted]
~~

T1C05 (A)
Which of the following is a vanity call sign which a technician class amateur operator might select if available?
A. K1XXX
[redacted]
~~

T1C06 (D) [97.5(a)(2)]
From which of the following locations may an FCC-licensed amateur station transmit, in addition to places where the FCC regulates communications?
[redacted]
D. From any vessel or craft located in international waters and documented or registered in the United States
~~

T1C07 (B) [97.23]
What may result when correspondence from the FCC is returned as undeliverable because the grantee failed to provide the correct mailing address?
[redacted]
B. Revocation of the station license or suspension of the operator license
[redacted]
~~

T1C08 (C) [97.25]
What is the normal term for an FCC-issued primary station/operator amateur radio license grant?
[redacted]
C. Ten years
[redacted]
~~

T1C09 (A) [97.21(a)(b)]
What is the grace period following the expiration of an amateur license within which the license may be renewed?
A. Two years
[redacted]
~~

T1C10 (C) [97.5a]
How soon after passing the examination for your first amateur radio license may you operate a transmitter on an amateur service frequency?
[redacted]
C. As soon as your operator/station license grant appears in the FCC's license database
[redacted]
~~

T1C11 (A) [97.21(b)]
If your license has expired and is still within the allowable grace period, may you continue to operate a transmitter on amateur service frequencies?
A. No, transmitting is not allowed until the FCC license database shows that the license has been renewed
[redacted]
~~

T1C12 (D) [97.19]
Who may select a desired call sign under the vanity call sign rules?
[redacted]
D. Any licensed amateur
~~

T1C13 (D) [97.9(a), 97.17(a)]
For which licenses classes are new licenses currently available from the FCC?
[redacted]
D. Technician, General, Amateur Extra
~~

T1C14 (D) [97.21(a) (1)]
Who may select a vanity call sign for a club station?
[redacted]
D. Only the person named as trustee on the club station license grant
~~
T1D - Authorized and prohibited transmission: communications with other countries; music; exchange of information with other services; indecent language; compensation for use of station; retransmission of other amateur signals; codes and ciphers; sale of equipment; unidentified transmissions; broadcasting

T1D01 (A) [97.111(a)(1)]
With which countries are FCC-licensed amateur stations prohibited from exchanging communications?
A. Any country whose administration has notified the ITU that it objects to such communications
[redacted]
~~

T1D02 (A) [97.111(a)(5)]
On which of the following occasions may an FCC-licensed amateur station exchange messages with a U.S. military station?
A. During an Armed Forces Day Communications Test
[redacted]
~~

T1D03 (C) [97.211(b), 97.215(b)]
When is the transmission of codes or ciphers that hide the meaning of a message allowed by an amateur station?
[redacted]
C. Only when transmitting control commands to space stations or radio control craft
[redacted]
~~

T1D04 (A) [97.113(a)(4), 97.113(c)]
What is the only time an amateur station is authorized to transmit music?
A. When incidental to an authorized retransmission of manned spacecraft communications
[redacted]
~~

T1D05 (A) [97.113(a)(3)(ii)]
When may amateur radio operators use their stations to notify other amateurs of the availability of equipment for sale or trade?
A. When the equipment is normally used in an amateur station and such activity is not conducted on a regular basis
[redacted]
~~

T1D06 (B) [97.113(a)(4)]
What, if any, are the restrictions concerning transmission of language that may be considered indecent or obscene?
[redacted]
B. Any such language is prohibited
[redacted]
~~

T1D07 (B) [97.113(d)]
What types of amateur stations can automatically retransmit the signals of other amateur stations?
[redacted]
B. Auxiliary, repeater, or space stations
[redacted]
~~

T1D08 (B) [97.113(a)(3)(iii)]
In which of the following circumstances may the control operator of an amateur station receive compensation for operating the station?
[redacted]
B. When the communication is incidental to classroom instruction at an educational institution
[redacted]
~~

T1D09 (A) [97.113(5)(b)]
Under which of the following circumstances are amateur stations authorized to transmit signals related to broadcasting, program production, or news gathering, assuming no other means is available?
A. Only where such communications directly relate to the immediate safety of human life or protection of property
[redacted]
~~

T1D10 (D) [97.3(a)(10)]
What is the meaning of the term “broadcasting” in the FCC rules for the amateur services?
[redacted]
D. Transmissions intended for reception by the general public
~~

T1D11 (D) [97.119(a)]
When may an amateur station transmit without identifying?
[redacted]
D. When transmitting signals to control a model craft
~~

T1D12 (B) [97.111(b)(4,5,6)
Under which of the following circumstances may an amateur radio station engage in broadcasting?
[redacted]
B. When transmitting code practice, information bulletins, or transmissions necessary to provide emergency communications
[redacted]
~~

T1E - Control operator and control types: control operator required; eligibility; designation of control operator; privileges and duties; control point; local, automatic and remote control; location of control operator

T1E01 (D) [97.7(a)]
When is an amateur station permitted to transmit without a control operator?
[redacted]
D. Never
~~

T1E02 (D) [97.7(a)]
Who may a station licensee designate to be the control operator of an amateur station?
[redacted]
D. Only a person for whom an amateur operator/primary station license grant appears in the FCC database or who is authorized for alien reciprocal operation
~~

T1E03 (A) [97.103(b)]
Who must designate the station control operator?
A. The station licensee
[redacted]
~~

T1E04 (D) [97.103(b)]
What determines the transmitting privileges of an amateur station?
[redacted]
D. The class of operator license held by the control operator
~~

T1E05 (C) [97.3(a)(14)]
What is an amateur station control point?
[redacted]
C. The location at which the control operator function is performed
[redacted]
~~

T1E06 (A) [97.109(d)]
Under what type of control do APRS network digipeaters operate?
A. Automatic
[redacted]
~~

T1E07 (D) [97.103(a)]
When the control operator is not the station licensee, who is responsible for the proper operation of the station?
[redacted]
D. The control operator and the station licensee are equally responsible
~~

T1E08 (A) [97.3(a)(6), 97.205(d)]
Which of the following is an example of automatic control?
A. Repeater operation
[redacted]
~~

T1E09 (D) [97.109(b)]
What type of control is being used when the control operator is at the control point?
[redacted]
D. Local control
~~

T1E10 (B) [97.3(a)(39)]
Which of the following is an example of remote control as defined in Part 97?
[redacted]
B. Operating the station over the Internet
[redacted]
~~

T1E11 (D) [97.103(a)]
Who does the FCC presume to be the control operator of an amateur station, unless documentation to the contrary is in the station records?
[redacted]
D. The station licensee
~~

T1E12 (A) [97.119(e)]
When, under normal circumstances, may a Technician Class licensee be the control operator of a station operating in an exclusive Extra Class operator segment of the amateur bands?
A. At no time
[redacted]
~~

T1F - Station identification; repeaters; third party communications; club stations; FCC inspection

T1F01 (A)
What type of identification is being used when identifying a station on the air as Race Headquarters?
A. Tactical call sign
[redacted]
~~

T1F02 (C) [97.119 (a)]
When using tactical identifiers such as “Race Headquarters” during a community service net operation, how often must your station transmit the station’s FCC-assigned call sign?
[redacted]
C. At the end of each communication and every ten minutes during a communication
[redacted]
~~

T1F03 (D) [97.119(a)]
When is an amateur station required to transmit its assigned call sign?
[redacted]
D. At least every 10 minutes during and at the end of a communication
~~

T1F04 (C) [97.119(b)(2)]
Which of the following is an acceptable language to use for station identification when operating in a phone sub-band?
[redacted]
C. The English language
[redacted]
~~

T1F05 (B) [97.119(b)(2)]
What method of call sign identification is required for a station transmitting phone signals?
[redacted]
B. Send the call sign using CW or phone emission
[redacted]
~~

T1F06 (D) [97.119(c)]
Which of the following formats of a self-assigned indicator is acceptable when identifying using a phone transmission?
[redacted]
D. All of these choices are correct
~~

T1F07 (B) [97.115(a)(2)]
Which of the following restrictions apply when a non-licensed person is allowed to speak to a foreign station using a station under the control of a Technician Class control operator?
[redacted]
B. The foreign station must be one with which the U.S. has a third party agreement
[redacted]
~~

T1F08 (D) [97.119(f)]
Which indicator is required by the FCC to be transmitted after a station call sign?
[redacted]
D. /KT, /AE or /AG when using new license privileges earned by CSCE while waiting for an upgrade to a previously issued license to appear in the FCC license database
~~

T1F09 (C) [97.3(a)(40)]
What type of amateur station simultaneously retransmits the signal of another amateur station on a different channel or channels?
C. Repeater station
~~

T1F10 (A) [97.205(g)]
Who is accountable should a repeater inadvertently retransmit communications that violate the FCC rules?
A. The control operator of the originating station
~~

T1F11 (A) [97.115(a)]
To which foreign stations do the FCC rules authorize the transmission of non-emergency third party communications?
A. Any station whose government permits such communications
~~

T1F12 (B) [97.5(b)(2)]
How many persons are required to be members of a club for a club station license to be issued by the FCC?
B. At least 4
~~

T1F13 (B) [97.103(c)]
When must the station licensee make the station and its records available for FCC inspection?
B. At any time upon request by an FCC representative
~~

SUBELEMENT T2 - Operating Procedures [3 Exam Questions - 3 Groups]

T2A - Station operation: choosing an operating frequency; calling another station; test transmissions; procedural signs; use of minimum power; choosing an operating frequency; band plans; calling frequencies; repeater offsets

T2A01 (B)
What is the most common repeater frequency offset in the 2 meter band?
[redacted]
B. Plus or minus 600 kHz
[redacted]
~~

T2A02 (D)
What is the national calling frequency for FM simplex operations in the 70 cm band?
[redacted]
D. 446.000 MHz
~~

T2A03 (A)
What is a common repeater frequency offset in the 70 cm band?
A. Plus or minus 5 MHz
[redacted]
~~

T2A04 (B)
What is an appropriate way to call another station on a repeater if you know the other station's call sign?
[redacted]
B. Say the station's call sign then identify with your call sign
[redacted]
~~

T2A05 (C)
How should you respond to a station calling CQ?
[redacted]
C. Transmit the other station’s call sign followed by your call sign
[redacted]
~~

T2A06 (A)
What must an amateur operator do when making on-air transmissions to test equipment or antennas?
A. Properly identify the transmitting station
[redacted]
~~

T2A07 (D)
Which of the following is true when making a test transmission?
[redacted]
D. Station identification is required at least every ten minutes during the test and at the end of the test
~~

T2A08 (D)
What is the meaning of the procedural signal “CQ”?
[redacted]
D. Calling any station
~~

T2A09 (B)
What brief statement is often transmitted in place of “CQ” to indicate that you are listening on a repeater?
[redacted]
B. Your call sign
[redacted]
~~

T2A10 (A)
What is a band plan, beyond the privileges established by the FCC?
A. A voluntary guideline for using different modes or activities within an amateur band
[redacted]
~~

T2A11 (D) [97.313(a)]
Which of the following is an FCC rule regarding power levels used in the amateur bands, under normal, non-distress circumstances?
[redacted]
D. While not exceeding the maximum power permitted on a given band, use the minimum power necessary to carry out the desired communication
~~

T2A12 (D)
Which of the following is a guideline to use when choosing an operating frequency for calling CQ?
[redacted]
D. All of these choices are correct
~~

T2B - VHF/UHF operating practices: SSB phone; FM repeater; simplex; splits and shifts; CTCSS; DTMF; tone squelch; carrier squelch; phonetics; operational problem resolution; Q signals

T2B01 (C)
What is the term used to describe an amateur station that is transmitting and receiving on the same frequency?
[redacted]
C. Simplex communication
[redacted]
~~

T2B02 (D)
What is the term used to describe the use of a sub-audible tone transmitted with normal voice audio to open the squelch of a receiver?
[redacted]
D. CTCSS
~~

T2B03 (B)
Which of the following describes the muting of receiver audio controlled solely by the presence or absence of an RF signal?
[redacted]
B. Carrier squelch
[redacted]
~~

T2B04 (D)
Which of the following common problems might cause you to be able to hear but not access a repeater even when transmitting with the proper offset?
[redacted]
D. All of these choices are correct
~~

T2B05 (C)
What determines the amount of deviation of an FM (as opposed to PM) signal?
[redacted]
C. The amplitude of the modulating signal
[redacted]
~~

T2B06 (A)
What happens when the deviation of an FM transmitter is increased?
A. Its signal occupies more bandwidth
[redacted]
~~

T2B07 (A)
What could cause your FM signal to interfere with stations on nearby frequencies?
A. Microphone gain too high, causing over-deviation
[redacted]
~~

T2B08 (A)
Which of the following applies when two stations transmitting on the same frequency interfere with each other?
A. Common courtesy should prevail, but no one has absolute right to an amateur frequency
[redacted]
~~

T2B09 (A) [97.119(b)(2)]
Which of the following methods is encouraged by the FCC when identifying your station when using phone?
A. Use of a phonetic alphabet
[redacted]
~~

T2B10 (A)
Which Q signal indicates that you are receiving interference from other stations?
A. QRM
[redacted]
~~

T2B11 (B)
Which Q signal indicates that you are changing frequency?
[redacted]
B. QSY
[redacted]
~~

T2B12 (A)
Under what circumstances should you consider communicating via simplex rather than a repeater?
A. When the stations can communicate directly without using a repeater
[redacted]
~~

T2B13 (C)
Which of the following is true of the use of SSB phone in amateur bands above 50 MHz?
[redacted]
C. It is permitted in at least some portion of all the amateur bands above 50 MHz
[redacted]
~~

T2C – Public service: emergency and non-emergency operations; applicability of FCC rules; RACES and ARES; net and traffic procedures; emergency restrictions

T2C01 (D) [97.103(a)]
When do the FCC rules NOT apply to the operation of an amateur station?
[redacted]
D. Never, FCC rules always apply
~~

T2C02 (C)
What is one way to recharge a 12-volt lead-acid station battery if the commercial power is out?
[redacted]
C. Connect the battery in parallel with a vehicle’s battery and run the engine
[redacted]
~~

T2C03 (C)
What should be done to insure that voice message traffic containing proper names and unusual words are copied correctly by the receiving station?

C. Such words and terms should be spelled out using a standard phonetic alphabet

~~

T2C04 (D)
What do RACES and ARES have in common?

D. Both organizations may provide communications during emergencies

~~

T2C05 (D) [97.3(a)(38), 97.407]
Which of the following describes the Radio Amateur Civil Emergency Service (RACES)?

D. All of these choices are correct

~~

T2C06 (C)
Which of the following is an accepted practice to get the immediate attention of a net control station when reporting an emergency?

C. Begin your transmission by saying "Priority" or "Emergency" followed by your call sign

~~

T2C07 (C)
Which of the following is an accepted practice for an amateur operator who has checked into an emergency traffic net?
[redacted]
C. Remain on frequency without transmitting until asked to do so by the net control station
[redacted]
~~

T2C08 (A)
Which of the following is a characteristic of good emergency traffic handling?
A. Passing messages exactly as received
[redacted]
~~

T2C09 (D)
Are amateur station control operators ever permitted to operate outside the frequency privileges of their license class?
[redacted]
D. Yes, but only if necessary in situations involving the immediate safety of human life or protection of property
~~

T2C10 (D)
What is the preamble in a formal traffic message?
[redacted]
D. The information needed to track the message as it passes through the amateur radio traffic handling system
~~

T2C11 (A)
What is meant by the term “check” in reference to a formal traffic message?
A. The check is a count of the number of words or word equivalents in the text portion of the message
[redacted]
~~

T2C12 (A)
What is the Amateur Radio Emergency Service (ARES)?
A. Licensed amateurs who have voluntarily registered their qualifications and equipment for communications duty in the public service
[redacted]
~~

SUBELEMENT T3 – Radio wave characteristics: properties of radio waves; propagation modes – [3 Exam Questions - 3 Groups]

T3A - Radio wave characteristics: how a radio signal travels; fading; multipath; wavelength vs. penetration; antenna orientation

T3A01 (D)
What should you do if another operator reports that your station’s 2 meter signals were strong just a moment ago, but now they are weak or distorted?
[redacted]
D. Try moving a few feet or changing the direction of your antenna if possible, as reflections may be causing multi-path distortion
~~

T3A02 (B)
Why are UHF signals often more effective from inside buildings than VHF signals?

B. The shorter wavelength allows them to more easily penetrate the structure of buildings

~~

T3A03 (C)
What antenna polarization is normally used for long-distance weak-signal CW and SSB contacts using the VHF and UHF bands?

C. Horizontal

~~

T3A04 (B)
What can happen if the antennas at opposite ends of a VHF or UHF line of sight radio link are not using the same polarization?

B. Signals could be significantly weaker

~~

T3A05 (B)
When using a directional antenna, how might your station be able to access a distant repeater if buildings or obstructions are blocking the direct line of sight path?

B. Try to find a path that reflects signals to the repeater

~~

T3A06 (B)
What term is commonly used to describe the rapid fluttering sound sometimes heard from mobile stations that are moving while transmitting?

B. Picket fencing

~~

T3A07 (A)
What type of wave carries radio signals between transmitting and receiving stations?
A. Electromagnetic
[redacted]
~~

T3A08 (C)
Which of the following is a likely cause of irregular fading of signals received by ionospheric reflection?
[redacted]
C. Random combining of signals arriving via different paths
[redacted]
~~

T3A09 (B)
Which of the following results from the fact that skip signals refracted from the ionosphere are elliptically polarized?
[redacted]
B. Either vertically or horizontally polarized antennas may be used for transmission or reception
[redacted]
~~

T3A10 (D)
What may occur if data signals propagate over multiple paths?
[redacted]
D. Error rates are likely to increase
~~

T3A11 (C)
Which part of the atmosphere enables the propagation of radio signals around the world?
[redacted]
C. The ionosphere
[redacted]
~~

T3B - Radio and electromagnetic wave properties: the electromagnetic spectrum; wavelength vs. frequency; velocity of electromagnetic waves; calculating wavelength

T3B01 (C)
What is the name for the distance a radio wave travels during one complete cycle?
[redacted]
C. Wavelength
[redacted]
~~

T3B02 (A)
What property of a radio wave is used to describe its polarization?
A. The orientation of the electric field
[redacted]
~~

T3B03 (C)
What are the two components of a radio wave?
[redacted]
C. Electric and magnetic fields
[redacted]
~~

T3B04 (A)
How fast does a radio wave travel through free space?
A. At the speed of light
[redacted]
~~

T3B05 (B)
How does the wavelength of a radio wave relate to its frequency?
[redacted]
B. The wavelength gets shorter as the frequency increases
[redacted]
~~

T3B06 (D)
What is the formula for converting frequency to approximate wavelength in meters?
[redacted]
D. Wavelength in meters equals 300 divided by frequency in megahertz
~~

T3B07 (A)
What property of radio waves is often used to identify the different frequency bands?
A. The approximate wavelength
[redacted]
~~

T3B08 (B)
What are the frequency limits of the VHF spectrum?
[redacted]
B. 30 to 300 MHz
[redacted]
~~

T3B09 (D)
What are the frequency limits of the UHF spectrum?
[redacted]
D. 300 to 3000 MHz
~~

T3B10 (C)
What frequency range is referred to as HF?

C. 3 to 30 MHz

~~

T3B11 (B)
What is the approximate velocity of a radio wave as it travels through free space?

B. 300,000,000 meters per second

~~

T3C - Propagation modes: line of sight; sporadic E; meteor and auroral scatter and reflections; tropospheric ducting; F layer skip; radio horizon

T3C01 (C)
Why are direct (not via a repeater) UHF signals rarely heard from stations outside your local coverage area?

C. UHF signals are usually not reflected by the ionosphere

~~

T3C02 (D)
Which of the following might be happening when VHF signals are being received from long distances?

D. Signals are being refracted from a sporadic E layer

~~

T3C03 (B)
What is a characteristic of VHF signals received via auroral reflection?
[redacted]
B. The signals exhibit rapid fluctuations of strength and often sound distorted
[redacted]
~~

T3C04 (B)
Which of the following propagation types is most commonly associated with occasional strong over-the-horizon signals on the 10, 6, and 2 meter bands?
[redacted]
B. Sporadic E
[redacted]
~~

T3C05 (A)
Which of the following effects might cause radio signals to be heard despite obstructions between the transmitting and receiving stations?
A. Knife-edge diffraction
[redacted]
~~

T3C06 (A)
What mode is responsible for allowing over-the-horizon VHF and UHF communications to ranges of approximately 300 miles on a regular basis?
A. Tropospheric scatter
[redacted]
~~

T3C07 (B)
What band is best suited for communicating via meteor scatter?
[redacted]
B. 6 meters
[redacted]

~~

T3C08 (D)
What causes tropospheric ducting?
[redacted]
D. Temperature inversions in the atmosphere
~~

T3C09 (A)
What is generally the best time for long-distance 10 meter band propagation via the F layer?
A. From dawn to shortly after sunset during periods of high sunspot activity
[redacted]
~~

T3C10 (A)
What is the radio horizon?
A. The distance over which two stations can communicate by direct path
[redacted]
~~

T3C11 (C)
Why do VHF and UHF radio signals usually travel somewhat farther than the visual line of sight distance between two stations?
[redacted]
C. The Earth seems less curved to radio waves than to light
[redacted]
~~

T3C12 (A)
Which of the following bands may provide long distance communications during the peak of the sunspot cycle?
A. Six or ten meters
[redacted]
~~

SUBELEMENT T4 - Amateur radio practices and station set up – [2 Exam Questions - 2 Groups]

T4A – Station setup: connecting microphones; reducing unwanted emissions; power source; connecting a computer; RF grounding; connecting digital equipment; connecting an SWR meter

T4A01 (B)
Which of the following is true concerning the microphone connectors on amateur transceivers?
[redacted]
B. Some connectors include push-to-talk and voltages for powering the microphone
[redacted]
~~

T4A02 (D)
How might a computer be used as part of an amateur radio station?
[redacted]
D. All of these choices are correct
~~

T4A03 (A)
Which is a good reason to use a regulated power supply for communications equipment?
A. It prevents voltage fluctuations from reaching sensitive circuits
[redacted]
~~

T4A04 (A)
Where must a filter be installed to reduce harmonic emissions from your station?
A. Between the transmitter and the antenna
[redacted]
~~

T4A05 (A)
Where should an in-line SWR meter be connected to monitor the standing wave ratio of the station antenna system?
A. In series with the feed line, between the transmitter and antenna
[redacted]
~~

T4A06 (C)
Which of the following would be connected between a transceiver and computer in a packet radio station?
[redacted]
C. Terminal node controller
[redacted]
~~

T4A07 (C)
How is a computer’s sound card used when conducting digital communications using a computer?
[redacted]
C. The sound card provides audio to the microphone input and converts received audio to digital form
[redacted]
~~

T4A08 (D)
Which type of conductor is best to use for RF grounding?
[redacted]
D. Flat strap
~~

T4A09 (D)
Which of the following could you use to cure distorted audio caused by RF current flowing on the shield of a microphone cable?
[redacted]
D. Ferrite choke
~~

T4A10 (B)
What is the source of a high-pitched whine that varies with engine speed in a mobile transceiver’s receive audio?
[redacted]
B. The alternator
[redacted]
~~

T4A11 (A)
Where should the negative return connection of a mobile transceiver's power cable be connected?
A. At the battery or engine block ground strap
[redacted]
~~

T4A12 (D)
What could be happening if another operator reports a variable high-pitched whine on the audio from your mobile transmitter?
[redacted]
D. Noise on the vehicle’s electrical system is being transmitted along with your speech audio
~~

T4B - Operating controls: tuning; use of filters; squelch function; AGC; repeater offset; memory channels

T4B01 (B)
What may happen if a transmitter is operated with the microphone gain set too high?
[redacted]
B. The output signal might become distorted
[redacted]
~~

T4B02 (A)
Which of the following can be used to enter the operating frequency on a modern transceiver?
A. The keypad or VFO knob
[redacted]
~~

T4B03 (D)
What is the purpose of the squelch control on a transceiver?
[redacted]
D. To mute receiver output noise when no signal is being received
~~

T4B04 (B)
What is a way to enable quick access to a favorite frequency on your transceiver?
[redacted]
B. Store the frequency in a memory channel
[redacted]
~~

T4B05 (C)
Which of the following would reduce ignition interference to a receiver?
[redacted]
C. Turn on the noise blanker
[redacted]
~~

T4B06 (D)
Which of the following controls could be used if the voice pitch of a single-sideband signal seems too high or low?
D. The receiver RIT or clarifier
~~

T4B07 (B)
What does the term "RIT" mean?
B. Receiver Incremental Tuning
~~

T4B08 (B)
What is the advantage of having multiple receive bandwidth choices on a multimode transceiver?
B. Permits noise or interference reduction by selecting a bandwidth matching the mode
~~

T4B09 (C)
Which of the following is an appropriate receive filter bandwidth to select in order to minimize noise and interference for SSB reception?
C. 2400 Hz
~~

T4B10 (A)
Which of the following is an appropriate receive filter bandwidth to select in order to minimize noise and interference for CW reception?
A. 500 Hz

~~

T4B11 (C)
Which of the following describes the common meaning of the term "repeater offset"?
[redacted]
C. The difference between the repeater’s transmit and receive frequencies
[redacted]
~~

T4B12 (A)
What is the function of automatic gain control or AGC?
A. To keep received audio relatively constant
[redacted]
~~

SUBELEMENT T5 – Electrical principles: math for electronics; electronic principles; Ohm’s Law – [4 Exam Questions - 4 Groups]

T5A - Electrical principles, units, and terms: current and voltage; conductors and insulators; alternating and direct current

T5A01 (D)
Electrical current is measured in which of the following units?
[redacted]
D. Amperes
~~

T5A02 (B)
Electrical power is measured in which of the following units?
[redacted]
B. Watts
[redacted]
~~

T5A03 (D)
What is the name for the flow of electrons in an electric circuit?
[redacted]
D. Current
~~

T5A04 (B)
What is the name for a current that flows only in one direction?
[redacted]
B. Direct current
[redacted]
~

T5A05 (A)
What is the electrical term for the electromotive force (EMF) that causes electron flow?
A. Voltage
[redacted]
~~

T5A06 (A)
How much voltage does a mobile transceiver usually require?
A. About 12 volts
[redacted]
~~

T5A07 (C)
Which of the following is a good electrical conductor?
[redacted]
C. Copper
[redacted]
~~

T5A08 (B)
Which of the following is a good electrical insulator?
[redacted]
B. Glass
[redacted]

~~

T5A09 (A)
What is the name for a current that reverses direction on a regular basis?
A. Alternating current
[redacted]
~~

T5A10 (C)
Which term describes the rate at which electrical energy is used?
[redacted]
C. Power
[redacted]
~~

T5A11 (A)
What is the basic unit of electromotive force?
A. The volt
[redacted]
~~

T5A12 (D)
What term describes the number of times per second that an alternating current reverses direction?
[redacted]
D. Frequency
~~

T5B - Math for electronics: conversion of electrical units; decibels; the metric system

T5B01 (C)
How many milliamperes is 1.5 amperes?
[redacted]
C. 1,500 milliamperes
[redacted]
~~

T5B02 (A)
What is another way to specify a radio signal frequency of 1,500,000 hertz?
A. 1500 kHz
[redacted]
~~

T5B03 (C)
How many volts are equal to one kilovolt?
[redacted]
C. One thousand volts
[redacted]
~~

T5B04 (A)
How many volts are equal to one microvolt?
A. One one-millionth of a volt
[redacted]
~~

T5B05 (B)
Which of the following is equivalent to 500 milliwatts?
[redacted]
B. 0.5 watts
[redacted]
~~

T5B06 (C)
If an ammeter calibrated in amperes is used to measure a 3000-milliampere current, what reading would it show?
[redacted]
C. 3 amperes
[redacted]
~~

T5B07 (C)
If a frequency readout calibrated in megahertz shows a reading of 3.525 MHz, what would it show if it were calibrated in kilohertz?
C. 3525 kHz
~~

T5B08 (B)
How many microfarads are 1,000,000 picofarads?
B. 1 microfarad
~~

T5B09 (B)
What is the approximate amount of change, measured in decibels (dB), of a power increase from 5 watts to 10 watts?
B. 3 dB
~~

T5B10 (C)
What is the approximate amount of change, measured in decibels (dB), of a power decrease from 12 watts to 3 watts?
C. -6 dB
~~

T5B11 (A)
What is the approximate amount of change, measured in decibels (dB), of a power increase from 20 watts to 200 watts?
A. 10 dB
~~

T5B12 (A)
Which of the following frequencies is equal to 28,400 kHz?
A. 28.400 MHz
[redacted]
~~

T5B13 (C)
If a frequency readout shows a reading of 2425 MHz, what frequency is that in GHz?
[redacted]
C. 2.425 GHz
[redacted]
~~

T5C - Electronic principles: capacitance; inductance; current flow in circuits; alternating current; definition of RF; DC power calculations; impedance

T5C01 (D)
What is the ability to store energy in an electric field called?
[redacted]
D. Capacitance
~~

T5C02 (A)
What is the basic unit of capacitance?
A. The farad
[redacted]
~~

T5C03 (D)
What is the ability to store energy in a magnetic field called?
[redacted]
D. Inductance
~~

T5C04 (C)
What is the basic unit of inductance?
[redacted]
C. The henry
[redacted]
~~

T5C05 (A)
What is the unit of frequency?
A. Hertz
[redacted]
~~

T5C06 (A)
What does the abbreviation "RF" refer to?
A. Radio frequency signals of all types
[redacted]
~~

T5C07 (C)
What is a usual name for electromagnetic waves that travel through space?
[redacted]
C. Radio waves
[redacted]
~~

T5C08 (A)
What is the formula used to calculate electrical power in a DC circuit?
A. Power (P) equals voltage (E) multiplied by current (I)
[redacted]
~~

T5C09 (A)
How much power is being used in a circuit when the applied voltage is 13.8 volts DC and the current is 10 amperes?
A. 138 watts
[redacted]
~~

T5C10 (B)
How much power is being used in a circuit when the applied voltage is 12 volts DC and the current is 2.5 amperes?
[redacted]
B. 30 watts
[redacted]
~~

T5C11 (B)
How many amperes are flowing in a circuit when the applied voltage is 12 volts DC and the load is 120 watts?
[redacted]
B. 10 amperes
[redacted]
~~

T5C12 (A)
What is meant by the term impedance?
A. It is a measure of the opposition to AC current flow in a circuit
[redacted]
~~

T5C13 (D)
What are the units of impedance?
[redacted]
D. Ohms
~~

T5D – Ohm’s Law: formulas and usage

T5D01 (B)
What formula is used to calculate current in a circuit?
[redacted]
B. Current (I) equals voltage (E) divided by resistance (R)
[redacted]
~~

T5D02 (A)
What formula is used to calculate voltage in a circuit?
A. Voltage (E) equals current (I) multiplied by resistance (R)
[redacted]
~~

T5D03 (B)
What formula is used to calculate resistance in a circuit?
[redacted]
B. Resistance (R) equals voltage (E) divided by current (I)
[redacted]
~~

T5D04 (B)
What is the resistance of a circuit in which a current of 3 amperes flows through a resistor connected to 90 volts?
[redacted]
B. 30 ohms
[redacted]
~~

T5D05 (C)
What is the resistance in a circuit for which the applied voltage is 12 volts and the current flow is 1.5 amperes?
[redacted]
C. 8 ohms
[redacted]
~~

T5D06 (A)
What is the resistance of a circuit that draws 4 amperes from a 12-volt source?
A. 3 ohms

~~

T5D07 (D)
What is the current flow in a circuit with an applied voltage of 120 volts and a resistance of 80 ohms?

D. 1.5 amperes
~~

T5D08 (C)
What is the current flowing through a 100-ohm resistor connected across 200 volts?

C. 2 amperes

~~

T5D09 (C)
What is the current flowing through a 24-ohm resistor connected across 240 volts?

C. 10 amperes

~~

T5D10 (A)
What is the voltage across a 2-ohm resistor if a current of 0.5 amperes flows through it?
A. 1 volt

~~

T5D11 (B)
What is the voltage across a 10-ohm resistor if a current of 1 ampere flows through it?
[redacted]
B. 10 volts
[redacted]
~~

T5D12 (D)
What is the voltage across a 10-ohm resistor if a current of 2 amperes flows through it?
[redacted]
D. 20 volts
~~

SUBELEMENT T6 – Electrical components: semiconductors; circuit diagrams; component functions – [4 Exam Questions - 4 Groups]

T6A - Electrical components: fixed and variable resistors; capacitors and inductors; fuses; switches; batteries

T6A01 (B)
What electrical component is used to oppose the flow of current in a DC circuit?
[redacted]
B. Resistor
[redacted]
~~

T6A02 (C)
What type of component is often used as an adjustable volume control?
[redacted]
C. Potentiometer
[redacted]
~~

T6A03 (B)
What electrical parameter is controlled by a potentiometer?
[redacted]
B. Resistance
[redacted]
~~

T6A04 (B)
What electrical component stores energy in an electric field?
[redacted]
B. Capacitor
[redacted]
~~

T6A05 (D)
What type of electrical component consists of two or more conductive surfaces separated by an insulator?
[redacted]
D. Capacitor
~~

T6A06 (C)
What type of electrical component stores energy in a magnetic field?
[redacted]
C. Inductor
[redacted]
~~

T6A07 (D)
What electrical component is usually composed of a coil of wire?
[redacted]
D. Inductor
~~

T6A08 (B)
What electrical component is used to connect or disconnect electrical circuits?
[redacted]
B. Switch
[redacted]
~~

T6A09 (A)
What electrical component is used to protect other circuit components from current overloads?
A. Fuse
[redacted]
~~

T6A10 (D)
Which of the following battery types is rechargeable?
[redacted]
D. All of these choices are correct
~~

T6A11 (B)
Which of the following battery types is not rechargeable?
[redacted]
B. Carbon-zinc
[redacted]
~~

T6B – Semiconductors: basic principles and applications of solid state devices; diodes and transistors

T6B01 (D)
What class of electronic components is capable of using a voltage or current signal to control current flow?
[redacted]
D. Transistors
~~

T6B02 (C)
What electronic component allows current to flow in only one direction?
[redacted]
C. Diode
[redacted]
~~

T6B03 (C)
Which of these components can be used as an electronic switch or amplifier?
[redacted]
C. Transistor
[redacted]
~~

T6B04 (B)
Which of the following components can be made of three layers of semiconductor material?
[redacted]
B. Transistor
[redacted]
~~

T6B05 (A)
Which of the following electronic components can amplify signals?
A. Transistor
[redacted]
~~

T6B06 (B)
How is the cathode lead of a semiconductor diode usually identified?
[redacted]
B. With a stripe
[redacted]
~~

T6B07 (B)
What does the abbreviation LED stand for?
[redacted]
B. Light Emitting Diode
[redacted]
~~

T6B08 (A)
What does the abbreviation FET stand for?
A. Field Effect Transistor
[redacted]
~~

T6B09 (C)
What are the names of the two electrodes of a diode?
[redacted]
C. Anode and cathode
[redacted]
~~

T6B10 (A)
What are the three electrodes of a PNP or NPN transistor?
A. Emitter, base, and collector
[redacted]
~~

T6B11 (B)
What at are the three electrodes of a field effect transistor?
[redacted]
B. Source, gate, and drain
[redacted]
~~

T6B12 (A)
What is the term that describes a transistor's ability to amplify a signal?
A. Gain
[redacted]

~~

T6C - Circuit diagrams; schematic symbols

T6C01 (C)
What is the name for standardized representations of components in an electrical wiring diagram?
[redacted]
C. Schematic symbols
[redacted]
~~

T6C02 (A)
What is component 1 in figure T1?
A. Resistor
[redacted]
~~

T6C03 (B)
What is component 2 in figure T1?
[redacted]
B. Transistor
[redacted]
~~

T6C04 (C)
What is component 3 in figure T1?
[redacted]
C. Lamp
[redacted]
~~

T6C05 (C)
What is component 4 in figure T1?
[redacted]
C. Battery
[redacted]
~~

T6C06 (B)
What is component 6 in figure T2?
[redacted]
B. Capacitor
[redacted]
~~

T6C07 (D)
What is component 8 in figure T2?
[redacted]
D. Light emitting diode
~~

T6C08 (C)
What is component 9 in figure T2?
[redacted]
C. Variable resistor
[redacted]
~~

T6C09 (D)
What is component 4 in figure T2?
[redacted]
D. Transformer
~~

T6C10 (D)
What is component 3 in figure T3?
[redacted]
D. Variable inductor
~~

T6C11 (A)
What is component 4 in figure T3?
A. Antenna
[redacted]
~~

T6C12 (A)
What do the symbols on an electrical circuit schematic diagram represent?
A. Electrical components
[redacted]
~~

T6C13 (C)
Which of the following is accurately represented in electrical circuit schematic diagrams?
[redacted]
C. The way components are interconnected
[redacted]
~~

T6D - Component functions: rectification; switches; indicators; power supply components; resonant circuit; shielding; power transformers; integrated circuits

T6D01 (B)
Which of the following devices or circuits changes an alternating current into a varying direct current signal?
[redacted]
B. Rectifier
[redacted]
~~

T6D02 (A)
What best describes a relay?
A. A switch controlled by an electromagnet
[redacted]
~~

T6D03 (A)
What type of switch is represented by component 3 in figure T2?
A. Single-pole single-throw

~~

T6D04 (C)
Which of the following can be used to display signal strength on a numeric scale?

C. Meter

~~

T6D05 (A)
What type of circuit controls the amount of voltage from a power supply?
A. Regulator

~~

T6D06 (B)
What component is commonly used to change 120V AC house current to a lower AC voltage for other uses?

B. Transformer

~~

T6D07 (A)
Which of the following is commonly used as a visual indicator?
A. LED

~~

T6D08 (D)
Which of the following is used together with an inductor to make a tuned circuit?
[redacted]
D. Capacitor
~~

T6D09 (C)
What is the name of a device that combines several semiconductors and other components into one package?
[redacted]
C. Integrated circuit
[redacted]
~~

T6D10 (C)
What is the function of component 2 in Figure T1?
[redacted]
C. Control the flow of current
[redacted]
~~

T6D11 (A)
What is a simple resonant or tuned circuit?
A. An inductor and a capacitor connected in series or parallel to form a filter
[redacted]
~~

T6D12 (C)
Which of the following is a common reason to use shielded wire?
[redacted]
C. To prevent coupling of unwanted signals to or from the wire
[redacted]
~~

SUBELEMENT T7 – Station equipment: common transmitter and receiver problems; antenna measurements; troubleshooting; basic repair and testing – [4 Exam Questions - 4 Groups]

T7A – Station equipment: receivers; transmitters; transceivers; modulation; transverters; low power and weak signal operation; transmit and receive amplifiers

T7A01 (B)
Which term describes the ability of a receiver to detect the presence of a signal?
[redacted]
B. Sensitivity
[redacted]
~~

T7A02 (B)
What is a transceiver?
[redacted]
B. A unit combining the functions of a transmitter and a receiver
[redacted]
~~

T7A03 (B)
Which of the following is used to convert a radio signal from one frequency to another?
[redacted]
B. Mixer
[redacted]
~~

T7A04 (C)
Which term describes the ability of a receiver to discriminate between multiple signals?
[redacted]
C. Selectivity
[redacted]
~~

T7A05 (D)
What is the name of a circuit that generates a signal of a desired frequency?
[redacted]
D. Oscillator
~~

T7A06 (C)
What device takes the output of a low-powered 28 MHz SSB exciter and produces a 222 MHz output signal?
[redacted]
C. Transverter
[redacted]
~~

T7A07 (D)
What is meant by term “PTT”?
[redacted]
D. The push to talk function which switches between receive and transmit
~~

T7A08 (C)
Which of the following describes combining speech with an RF carrier signal?-
[redacted]
C. Modulation
[redacted]
~~

T7A09 (B)
Which of the following devices is most useful for VHF weak-signal communication?
[redacted]
B. A multi-mode VHF transceiver
[redacted]
~~

T7A10 (B)
What device increases the low-power output from a handheld transceiver?
[redacted]
B. An RF power amplifier
[redacted]
~~

T7A11 (A)
Where is an RF preamplifier installed?
A. Between the antenna and receiver
[redacted]
~~

T7B – Common transmitter and receiver problems: symptoms of overload and overdrive; distortion; causes of interference; interference and consumer electronics; part 15 devices; over and under modulation; RF feedback; off frequency signals; fading and noise; problems with digital communications interfaces

T7B01 (D)
What can you do if you are told your FM handheld or mobile transceiver is over-deviating?
[redacted]
D. Talk farther away from the microphone
~~

T7B02 (A)
What would cause a broadcast AM or FM radio to receive an amateur radio transmission unintentionally?
A. The receiver is unable to reject strong signals outside the AM or FM band
[redacted]
~~

T7B03 (D)
Which of the following may be a cause of radio frequency interference?

D. All of these choices are correct
~~

T7B04 (D)
Which of the following is a way to reduce or eliminate interference by an amateur transmitter to a nearby telephone?

D. Put a RF filter on the telephone
~~

T7B05 (A)
How can overload of a non-amateur radio or TV receiver by an amateur signal be reduced or eliminated?
A. Block the amateur signal with a filter at the antenna input of the affected receiver

~~

T7B06 (A)
Which of the following actions should you take if a neighbor tells you that your station’s transmissions are interfering with their radio or TV reception?
A. Make sure that your station is functioning properly and that it does not cause interference to your own radio or television when it is tuned to the same channel

~~

T7B07 (D)
Which of the following may be useful in correcting a radio frequency interference problem?
[redacted]
D. All of these choices are correct
~~

T7B08 (D)
What should you do if something in a neighbor’s home is causing harmful interference to your amateur station?
[redacted]
D. All of these choices are correct
~~

T7B09 (A)
What is a Part 15 device?
A. An unlicensed device that may emit low powered radio signals on frequencies used by a licensed service
[redacted]
~~

T7B10 (D)
What might be the problem if you receive a report that your audio signal through the repeater is distorted or unintelligible?
[redacted]
D. All of these choices are correct
~~

T7B11 (C)
What is a symptom of RF feedback in a transmitter or transceiver?
[redacted]
C. Reports of garbled, distorted, or unintelligible transmissions
[redacted]

~~

T7B12 (D)
What might be the first step to resolve cable TV interference from your ham radio transmission?
[redacted]
D. Be sure all TV coaxial connectors are installed properly
~~

T7C – Antenna measurements and troubleshooting: measuring SWR; dummy loads; coaxial cables; feed line failure modes

T7C01 (A)
What is the primary purpose of a dummy load?
A. To prevent the radiation of signals when making tests
[redacted]
~~

T7C02 (B)
Which of the following instruments can be used to determine if an antenna is resonant at the desired operating frequency?
[redacted]
B. An antenna analyzer
[redacted]
~~

T7C03 (A)
What, in general terms, is standing wave ratio (SWR)?
A. A measure of how well a load is matched to a transmission line
[redacted]
~~

T7C04 (C)
What reading on an SWR meter indicates a perfect impedance match between the antenna and the feed line?
[redacted]
C. 1 to 1
[redacted]

~~

T7C05 (A)
What is the approximate SWR value above which the protection circuits in most solid-state transmitters begin to reduce transmitter power?
A. 2 to 1

~~

T7C06 (D)
What does an SWR reading of 4:1 indicate?

D. Impedance mismatch
~~

T7C07 (C)
What happens to power lost in a feed line?

C. It is converted into heat

~~

T7C08 (D)
What instrument other than an SWR meter could you use to determine if a feed line and antenna are properly matched?

D. Directional wattmeter
~~

T7C09 (A)
Which of the following is the most common cause for failure of coaxial cables?
A. Moisture contamination

~~

T7C10 (D)
Why should the outer jacket of coaxial cable be resistant to ultraviolet light?

D. Ultraviolet light can damage the jacket and allow water to enter the cable
~~

T7C11 (C)
What is a disadvantage of air core coaxial cable when compared to foam or solid dielectric types?

C. It requires special techniques to prevent water absorption
~~

T7C12 (B)
Which of the following is a common use of coaxial cable?

B. Carrying RF signals between a radio and antenna
~~

T7C13 (B)
What does a dummy load consist of?

B. A non-inductive resistor and a heat sink
~~

T7D – Basic repair and testing: soldering; using basic test instruments; connecting a voltmeter, ammeter, or ohmmeter

T7D01 (B)
Which instrument would you use to measure electric potential or electromotive force?

B. A voltmeter
~~

T7D02 (B)
What is the correct way to connect a voltmeter to a circuit?
[redacted]
B. In parallel with the circuit
[redacted]
~~

T7D03 (A)
How is an ammeter usually connected to a circuit?
A. In series with the circuit
[redacted]
~~

T7D04 (D)
Which instrument is used to measure electric current?
[redacted]
D. An ammeter
~~

T7D05 (D)
What instrument is used to measure resistance?
[redacted]
D. An ohmmeter
~~

T7D06 (C)
Which of the following might damage a multimeter?
[redacted]
C. Attempting to measure voltage when using the resistance setting
[redacted]
~~

T7D07 (D)
Which of the following measurements are commonly made using a multimeter?
[redacted]
D. Voltage and resistance
~~

T7D08 (C)
Which of the following types of solder is best for radio and electronic use?
[redacted]
C. Rosin-core solder
[redacted]
~~

T7D09 (C)
What is the characteristic appearance of a cold solder joint?
[redacted]
C. A grainy or dull surface
[redacted]
~~

T7D10 (B)
What is probably happening when an ohmmeter, connected across an unpowered circuit, initially indicates a low resistance and then shows increasing resistance with time?
[redacted]
B. The circuit contains a large capacitor
[redacted]
~~

T7D11 (B)
Which of the following precautions should be taken when measuring circuit resistance with an ohmmeter?
[redacted]
B. Ensure that the circuit is not powered
[redacted]
~~

T7D12 (B)
Which of the following precautions should be taken when measuring high voltages with a voltmeter?
[redacted]
B. Ensure that the voltmeter and leads are rated for use at the voltages to be measured
[redacted]
~~

SUBELEMENT T8 – Modulation modes: amateur satellite operation; operating activities; non-voice communications – [4 Exam Questions - 4 Groups]

T8A – Modulation modes: bandwidth of various signals; choice of emission type

T8A01 (C)
Which of the following is a form of amplitude modulation?
[redacted]
C. Single sideband
[redacted]
~~

T8A02 (A)
What type of modulation is most commonly used for VHF packet radio transmissions?
A. FM
[redacted]
~~

T8A03 (C)
Which type of voice mode is most often used for long-distance (weak signal) contacts on the VHF and UHF bands?
[redacted]
C. SSB
[redacted]
~~

T8A04 (D)
Which type of modulation is most commonly used for VHF and UHF voice repeaters?

D. FM
~~

T8A05 (C)
Which of the following types of emission has the narrowest bandwidth?

C. CW

~~

T8A06 (A)
Which sideband is normally used for 10 meter HF, VHF and UHF single-sideband communications?
A. Upper sideband

~~

T8A07 (C)
What is the primary advantage of single sideband over FM for voice transmissions?

C. SSB signals have narrower bandwidth

~~

T8A08 (B)
What is the approximate bandwidth of a single sideband voice signal?

B. 3 kHz

~~

T8A09 (C)
What is the approximate bandwidth of a VHF repeater FM phone signal?
[redacted]
C. Between 10 and 15 kHz
[redacted]
~~

T8A10 (B)
What is the typical bandwidth of analog fast-scan TV transmissions on the 70 cm band?
[redacted]
B. About 6 MHz
[redacted]
~~

T8A11 (B)
What is the approximate maximum bandwidth required to transmit a CW signal?
[redacted]
B. 150 Hz
[redacted]
~~

T8B - Amateur satellite operation; Doppler shift, basic orbits, operating protocols; control operator, transmitter power considerations; satellite tracking; digital modes

T8B01 (D) [97.301, 97.207(c)]
Who may be the control operator of a station communicating through an amateur satellite or space station?
[redacted]
D. Any amateur whose license privileges allow them to transmit on the satellite uplink frequency
~~

T8B02 (B) [97.313]
How much transmitter power should be used on the uplink frequency of an amateur satellite or space station?
[redacted]
B. The minimum amount of power needed to complete the contact
[redacted]
~~

T8B03 (D)
Which of the following are provided by satellite tracking programs?
[redacted]
D. All of these answers are correct
~~

T8B04 (B) [97.301, 97.207(c)]
Which amateur stations may make contact with an amateur station on the International Space Station using 2 meter and 70 cm band amateur radio frequencies?
[redacted]
B. Any amateur holding a Technician or higher class license
[redacted]
~~

T8B05 (D)
What is a satellite beacon?
[redacted]
D. A transmission from a space station that contains information about a satellite
~~

T8B06 (B)
Which of the following are inputs to a satellite tracking program?
[redacted]
B. The Keplerian elements
[redacted]
~~

T8B07 (C)
With regard to satellite communications, what is Doppler shift?

C. An observed change in signal frequency caused by relative motion between the satellite and the earth station

~~

T8B08 (B)
What is meant by the statement that a satellite is operating in mode U/V?

B. The satellite uplink is in the 70 cm band and the downlink is in the 2 meter band

~~

T8B09 (B)
What causes spin fading when referring to satellite signals?

B. Rotation of the satellite and its antennas

~~

T8B10 (C)
What do the initials LEO tell you about an amateur satellite?

C. The satellite is in a Low Earth Orbit

~~

T8B11 (C)
What is a commonly used method of sending signals to and from a digital satellite?

C. FM Packet

~~

T8C – Operating activities: radio direction finding; radio control; contests; linking over the Internet; grid locators

T8C01 (C)
Which of the following methods is used to locate sources of noise interference or jamming?
[redacted]
C. Radio direction finding
[redacted]
~~

T8C02 (B)
Which of these items would be useful for a hidden transmitter hunt?
[redacted]
B. A directional antenna
[redacted]
~~

T8C03 (A)
What popular operating activity involves contacting as many stations as possible during a specified period of time?
A. Contesting
[redacted]
~~

T8C04 (C)
Which of the following is good procedure when contacting another station in a radio contest?
[redacted]
C. Send only the minimum information needed for proper identification and the contest exchange
[redacted]
~~

T8C05 (A)
What is a grid locator?
A. A letter-number designator assigned to a geographic location
[redacted]

~~

T8C06 (B)
How is access to an IRLP node accomplished?
[redacted]
B. By using DTMF signals
[redacted]
~~

T8C07 (B) [97.215(c)]
What is the maximum power allowed when transmitting telecommand signals to radio controlled models?
[redacted]
B. 1 watt
[redacted]
~~

T8C08 (C) [97.215(a)]
What is required in place of on-air station identification when sending signals to a radio control model using amateur frequencies?
[redacted]
C. A label indicating the licensee’s name, call sign and address must be affixed to the transmitter
[redacted]
~~

T8C09 (C)
How might you obtain a list of active nodes that use VoIP?
[redacted]
C. From a repeater directory
[redacted]
~~

T8C10 (D)
How do you select a specific IRLP node when using a portable transceiver?
[redacted]
D. Use the keypad to transmit the IRLP node ID
~~

T8C11 (A)
What name is given to an amateur radio station that is used to connect other amateur stations to the Internet?
A. A gateway
[redacted]
~~

T8C12 (D)
What is meant by Voice Over Internet Protocol (VoIP) as used in amateur radio?
[redacted]
D. A method of delivering voice communications over the Internet using digital techniques
~~

T8C13 (A)
What is the Internet Radio Linking Project (IRLP)?
A. A technique to connect amateur radio systems, such as repeaters, via the Internet using Voice Over Internet Protocol
[redacted]
~~

T8D – Non-voice communications: image signals; digital modes; CW; packet; PSK31; APRS; error detection and correction; NTSC

T8D01 (D)
Which of the following is an example of a digital communications method?
[redacted]
D. All of these choices are correct
~~

T8D02 (A)
What does the term "APRS" mean?
A. Automatic Packet Reporting System
[redacted]
~~

T8D03 (D)
Which of the following devices provides data to the transmitter when sending automatic position reports from a mobile amateur radio station?
[redacted]
D. A Global Positioning System receiver
~~

T8D04 (C)
What type of transmission is indicated by the term NTSC?
[redacted]
C. An analog fast scan color TV signal
[redacted]
~~

T8D05 (A)
Which of the following is an application of APRS (Automatic Packet Reporting System)?
A. Providing real time tactical digital communications in conjunction with a map showing the locations of stations
[redacted]
~~

T8D06 (B)
What does the abbreviation PSK mean?
[redacted]
B. Phase Shift Keying
[redacted]
~~

T8D07 (D)
What is PSK31?

D. A low-rate data transmission mode
~~

T8D08 (D)
Which of the following may be included in packet transmissions?

D. All of these choices are correct
~~

T8D09 (C)
What code is used when sending CW in the amateur bands?

C. International Morse

~~

T8D10 (D)
Which of the following can be used to transmit CW in the amateur bands?

D. All of these choices are correct
~~

T8D11 (C)
What is an ARQ transmission system?

C. A digital scheme whereby the receiving station detects errors and sends a request to the sending station to retransmit the information

~~

SUBELEMENT T9 – Antennas and feed lines - [2 Exam Questions - 2 Groups]

T9A – Antennas: vertical and horizontal polarization; concept of gain; common portable and mobile antennas; relationships between antenna length and frequency

T9A01 (C)
What is a beam antenna?
[redacted]
C. An antenna that concentrates signals in one direction
[redacted]
~~

T9A02 (B)
Which of the following is true regarding vertical antennas?
[redacted]
B. The electric field is perpendicular to the Earth
[redacted]
~~

T9A03 (B)
Which of the following describes a simple dipole mounted so the conductor is parallel to the Earth's surface?
[redacted]
B. A horizontally polarized antenna
[redacted]
~~

T9A04 (A)
What is a disadvantage of the “rubber duck” antenna supplied with most handheld radio transceivers?
A. It does not transmit or receive as effectively as a full-sized antenna
[redacted]
~~

T9A05 (C)
How would you change a dipole antenna to make it resonant on a higher frequency?
[redacted]
C. Shorten it
[redacted]
~~

T9A06 (C)
What type of antennas are the quad, Yagi, and dish?
[redacted]
C. Directional antennas
[redacted]
~~

T9A07 (A)
What is a good reason not to use a “rubber duck” antenna inside your car?
A. Signals can be significantly weaker than when it is outside of the vehicle
[redacted]
~~

T9A08 (C)
What is the approximate length, in inches, of a quarter-wavelength vertical antenna for 146 MHz?
[redacted]
C. 19
[redacted]
~~

T9A09 (C)
What is the approximate length, in inches, of a 6 meter 1/2-wavelength wire dipole antenna?
[redacted]
C. 112
[redacted]
~~

T9A10 (C)
In which direction is the radiation strongest from a half-wave dipole antenna in free space?

C. Broadside to the antenna

~~

T9A11 (C)
What is meant by the gain of an antenna?

C. The increase in signal strength in a specified direction when compared to a reference antenna

~~

T9A12 (A)
What is a reason to use a properly mounted 5/8 wavelength antenna for VHF or UHF mobile service?
A. It offers a lower angle of radiation and more gain than a 1/4 wavelength antenna and usually provides improved coverage

~~

T9A13 (C)
Why are VHF or UHF mobile antennas often mounted in the center of the vehicle roof?

C. A roof mounted antenna normally provides the most uniform radiation pattern

~~

T9A14 (A)
Which of the following terms describes a type of loading when referring to an antenna?
A. Inserting an inductor in the radiating portion of the antenna to make it electrically longer
[redacted]
~~

T9B – Feed lines: types of feed lines; attenuation vs. frequency; SWR concepts; matching; weather protection; choosing RF connectors and feed lines

T9B01 (B)
Why is it important to have a low SWR in an antenna system that uses coaxial cable feed line?
[redacted]
B. To allow the efficient transfer of power and reduce losses
[redacted]
~~

T9B02 (B)
What is the impedance of the most commonly used coaxial cable in typical amateur radio installations?
[redacted]
B. 50 ohms
[redacted]
~~

T9B03 (A)
Why is coaxial cable used more often than any other feed line for amateur radio antenna systems?
A. It is easy to use and requires few special installation considerations
[redacted]
~~

T9B04 (A)
What does an antenna tuner do?
A. It matches the antenna system impedance to the transceiver's output impedance
[redacted]
~~

T9B05 (D)
What generally happens as the frequency of a signal passing through coaxial cable is increased?
[redacted]
D. The loss increases
~~

T9B06 (B)
Which of the following connectors is most suitable for frequencies above 400 MHz?
[redacted]
B. A Type N connector
[redacted]
~~

T9B07 (C)
Which of the following is true of PL-259 type coax connectors?
[redacted]
C. They are commonly used at HF frequencies
[redacted]
~~

T9B08 (A)
Why should coax connectors exposed to the weather be sealed against water intrusion?
A. To prevent an increase in feed line loss
[redacted]
~~

T9B09 (B)
What might cause erratic changes in SWR readings?
[redacted]
B. A loose connection in an antenna or a feed line
[redacted]
~~

T9B10 (C)
What electrical difference exists between the smaller RG-58 and larger RG-8 coaxial cables?
[redacted]
C. RG-8 cable has less loss at a given frequency
[redacted]
~~

T9B11 (C)
Which of the following types of feed line has the lowest loss at VHF and UHF?
[redacted]
C. Air-insulated hard line
[redacted]
~~
SUBELEMENT T0 – Electrical safety: AC and DC power circuits; antenna installation; RF hazards – [3 Exam Questions - 3 Groups]

T0A – Power circuits and hazards: hazardous voltages; fuses and circuit breakers; grounding; lightning protection; battery safety; electrical code compliance

T0A01 (B)
Which of the following is a safety hazard of a 12-volt storage battery?
[redacted]
B. Shorting the terminals can cause burns, fire, or an explosion
[redacted]
~~

T0A02 (D)
How does current flowing through the body cause a health hazard?
D. All of these choices are correct
~~

T0A03 (C)
What is connected to the green wire in a three-wire electrical AC plug?
C. Safety ground
~~

T0A04 (B)
What is the purpose of a fuse in an electrical circuit?
B. To interrupt power in case of overload
~~

T0A05 (C)
Why is it unwise to install a 20-ampere fuse in the place of a 5-ampere fuse?
C. Excessive current could cause a fire
~~

T0A06 (D)
What is a good way to guard against electrical shock at your station?
D. All of these choices are correct
~~

T0A07 (D)
Which of these precautions should be taken when installing devices for lightning protection in a coaxial cable feed line?

D. Ground all of the protectors to a common plate which is in turn connected to an external ground
~~

T0A08 (A)
What safety equipment should always be included in home-built equipment that is powered from 120V AC power circuits?
A. A fuse or circuit breaker in series with the AC hot conductor

~~

T0A09 (C)
What kind of hazard is presented by a conventional 12-volt storage battery?

C. Explosive gas can collect if not properly vented

~~

T0A10 (A)
What can happen if a lead-acid storage battery is charged or discharged too quickly?
A. The battery could overheat and give off flammable gas or explode

~~

T0A11 (D)
What kind of hazard might exist in a power supply when it is turned off and disconnected?

D. You might receive an electric shock from the charged stored in large capacitors
~~

T0B – Antenna safety: tower safety; erecting an antenna support; overhead power lines; installing an antenna

T0B01 (C)
When should members of a tower work team wear a hard hat and safety glasses?

C. At all times when any work is being done on the tower

~~

T0B02 (C)
What is a good precaution to observe before climbing an antenna tower?

C. Put on a climbing harness and safety glasses

~~

T0B03 (D)
Under what circumstances is it safe to climb a tower without a helper or observer?

D. Never
~~

T0B04 (C)
Which of the following is an important safety precaution to observe when putting up an antenna tower?

C. Look for and stay clear of any overhead electrical wires

~~

T0B05 (C)
What is the purpose of a gin pole?

C. To lift tower sections or antennas

~~

T0B06 (D)
What is the minimum safe distance from a power line to allow when installing an antenna?

D. So that if the antenna falls unexpectedly, no part of it can come closer than 10 feet to the power wires

~~

T0B07 (C)
Which of the following is an important safety rule to remember when using a crank-up tower?

C. This type of tower must never be climbed unless it is in the fully retracted position

~~

T0B08 (C)
What is considered to be a proper grounding method for a tower?

C. Separate eight-foot long ground rods for each tower leg, bonded to the tower and each other

~~

T0B09 (C)
Why should you avoid attaching an antenna to a utility pole?

C. The antenna could contact high-voltage power wires

~~

T0B10 (C)
Which of the following is true concerning grounding conductors used for lightning protection?

C. Sharp bends must be avoided

~~

T0B11 (B)
Which of the following establishes grounding requirements for an amateur radio tower or antenna?

B. Local electrical codes

~~

T0B12 (C)
Which of the following is good practice when installing ground wires on a tower for lightning protection?

C. Ensure that connections are short and direct

~~

T0C - RF hazards: radiation exposure; proximity to antennas; recognized safe power levels; exposure to others; radiation types; duty cycle

T0C01 (D)
What type of radiation are VHF and UHF radio signals?

D. Non-ionizing radiation

~~

T0C02 (B)
Which of the following frequencies has the lowest value for Maximum Permissible Exposure limit?
[redacted]
B. 50 MHz
[redacted]
~~

T0C03 (C)
What is the maximum power level that an amateur radio station may use at VHF frequencies before an RF exposure evaluation is required?
[redacted]
C. 50 watts PEP at the antenna
[redacted]
~~

T0C04 (D)
What factors affect the RF exposure of people near an amateur station antenna?
[redacted]
D. All of these choices are correct
~~

T0C05 (D)
Why do exposure limits vary with frequency?
[redacted]
D. The human body absorbs more RF energy at some frequencies than at others
~~

T0C06 (D)
Which of the following is an acceptable method to determine that your station complies with FCC RF exposure regulations?
[redacted]
D. All of these choices are correct

~~

T0C07 (B)
What could happen if a person accidentally touched your antenna while you were transmitting?
[redacted]
B. They might receive a painful RF burn
[redacted]
~~

T0C08 (A)
Which of the following actions might amateur operators take to prevent exposure to RF radiation in excess of FCC-supplied limits?
A. Relocate antennas
[redacted]
~~

T0C09 (B)
How can you make sure your station stays in compliance with RF safety regulations?
[redacted]
B. By re-evaluating the station whenever an item of equipment is changed
[redacted]
~~

T0C10 (A)
Why is duty cycle one of the factors used to determine safe RF radiation exposure levels?
A. It affects the average exposure of people to radiation
[redacted]
~~

T0C11 (C)
What is the definition of duty cycle during the averaging time for RF exposure?
[redacted]
C. The percentage of time that a transmitter is transmitting
[redacted]
~~

T0C12 (A)
How does RF radiation differ from ionizing radiation (radioactivity)?
A. RF radiation does not have sufficient energy to cause genetic damage
[redacted]
~~

T0C13 (C)
If the averaging time for exposure is 6 minutes, how much power density is permitted if the signal is present for 3 minutes and absent for 3 minutes rather than being present for the entire 6 minutes?
[redacted]
C. 2 times as much
[redacted]
~~