

**2022-2026 Technician Class
FCC Element 2 Question Pool
Effective 7/01/2022 – 6/30/2026**

SUBELEMENT T8 – SIGNALS AND EMISSIONS – [4 Exam Questions - 4 Groups]

T8A – Basic characteristics of FM and SSB; Bandwidth of various modulation modes: CW, SSB, FM, fast-scan TV; Choice of emission type: selection of USB vs LSB, use of SSB for weak signal work, use of FM for VHF packet and repeaters

T8A01

Which of the following is a form of amplitude modulation?

- A. Spread spectrum
- B. Packet radio
- C. Single sideband
- D. Phase shift keying (PSK)

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T8A02

What type of modulation is commonly used for VHF packet radio transmissions?

- A. FM or PM
- B. SSB
- C. AM
- D. PSK

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T8A03

Which type of voice mode is often used for long-distance (weak signal) contacts on the VHF and UHF bands?

- A. FM
- B. DRM
- C. SSB
- D. PM

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T8A04

Which type of modulation is commonly used for VHF and UHF voice repeaters?

- A. AM
- B. SSB
- C. PSK
- D. FM or PM

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T8A05

Which of the following types of signal has the narrowest bandwidth?

- A. FM voice
- B. SSB voice
- C. CW**
- D. Slow-scan TV

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T8A06

Which sideband is normally used for 10 meter HF, VHF, and UHF single-sideband communications?

- A. Upper sideband**
- B. Lower sideband
- C. Suppressed sideband
- D. Inverted sideband

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T8A07

What is a characteristic of single sideband (SSB) compared to FM?

- A. SSB signals are easier to tune in correctly
- B. SSB signals are less susceptible to interference
- C. SSB signals have narrower bandwidth**
- D. All these choices are correct

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T8A08

What is the approximate bandwidth of a typical single sideband (SSB) voice signal?

- A. 1 kHz
- B. 3 kHz**
- C. 6 kHz
- D. 15 kHz

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T8A09

What is the approximate bandwidth of a VHF repeater FM voice signal?

- A. Less than 500 Hz
- B. About 150 kHz
- C. Between 10 and 15 kHz**
- D. Between 50 and 125 kHz

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T8A10

What is the approximate bandwidth of AM fast-scan TV transmissions?

- A. More than 10 MHz
- B. About 6 MHz**
- C. About 3 MHz
- D. About 1 MHz

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T8A11

What is the approximate bandwidth required to transmit a CW signal?

- A. 2.4 kHz
- B. 150 Hz**
- C. 1000 Hz
- D. 15 kHz

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T8A12

Which of the following is a disadvantage of FM compared with single sideband?

- A. Voice quality is poorer
- B. Only one signal can be received at a time**
- C. FM signals are harder to tune
- D. All these choices are correct

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T8B - Amateur satellite operation: Doppler shift, basic orbits, operating protocols, modulation mode selection, transmitter power considerations, telemetry and telecommand, satellite tracking programs, beacons, uplink and downlink mode definitions, spin fading, definition of "LEO", setting uplink power

T8B01

What telemetry information is typically transmitted by satellite beacons?

- A. The signal strength of received signals
- B. Time of day accurate to plus or minus 1/10 second
- C. Health and status of the satellite**
- D. All these choices are correct

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T8B02

What is the impact of using excessive effective radiated power on a satellite uplink?

- A. Possibility of commanding the satellite to an improper mode
- B. Blocking access by other users**
- C. Overloading the satellite batteries
- D. Possibility of rebooting the satellite control computer

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T8B03

Which of the following are provided by satellite tracking programs?

- A. Maps showing the real-time position of the satellite track over Earth
- B. The time, azimuth, and elevation of the start, maximum altitude, and end of a pass
- C. The apparent frequency of the satellite transmission, including effects of Doppler shift
- D. All these choices are correct**

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T8B04

What mode of transmission is commonly used by amateur radio satellites?

- A. SSB
- B. FM
- C. CW/data
- D. All these choices are correct

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T8B05

What is a satellite beacon?

- A. The primary transmit antenna on the satellite
- B. An indicator light that shows where to point your antenna
- C. A reflective surface on the satellite
- D. A transmission from a satellite that contains status information

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T8B06

Which of the following are inputs to a satellite tracking program?

- A. The satellite transmitted power
- B. The Keplerian elements
- C. The last observed time of zero Doppler shift
- D. All these choices are correct

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T8B07

What is Doppler shift in reference to satellite communications?

- A. A change in the satellite orbit
- B. A mode where the satellite receives signals on one band and transmits on another
- C. An observed change in signal frequency caused by relative motion between the satellite and Earth station
- D. A special digital communications mode for some satellites

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T8B08

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

- A. The satellite uplink is in the 15 meter band and the downlink is in the 10 meter band
- B. The satellite uplink is in the 70 centimeter band and the downlink is in the 2 meter band
- C. The satellite operates using ultraviolet frequencies
- D. The satellite frequencies are usually variable

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T8B09

What causes spin fading of satellite signals?

- A. Circular polarized noise interference radiated from the sun
- B. Rotation of the satellite and its antennas
- C. Doppler shift of the received signal
- D. Interfering signals within the satellite uplink band

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T8B10

What is a LEO satellite?

- A. A sun synchronous satellite
- B. A highly elliptical orbit satellite
- C. A satellite in low energy operation mode
- D. A satellite in low earth orbit

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T8B11

Who may receive telemetry from a space station?

- A. Anyone
- B. A licensed radio amateur with a transmitter equipped for interrogating the satellite
- C. A licensed radio amateur who has been certified by the protocol developer
- D. A licensed radio amateur who has registered for an access code from AMSAT

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T8B12

Which of the following is a way to determine whether your satellite uplink power is neither too low nor too high?

- A. Check your signal strength report in the telemetry data
- B. Listen for distortion on your downlink signal
- C. Your signal strength on the downlink should be about the same as the beacon
- D. All these choices are correct

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T8C – Operating activities: radio direction finding, contests, linking over the internet, exchanging grid locators

T8C01

Which of the following methods is used to locate sources of noise interference or jamming?

- A. Echolocation
- B. Doppler radar
- C. Radio direction finding
- D. Phase locking

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T8C02

Which of these items would be useful for a hidden transmitter hunt?

- A. Calibrated SWR meter
- B. A directional antenna
- C. A calibrated noise bridge
- D. All these choices are correct

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T8C03

What operating activity involves contacting as many stations as possible during a specified period?

- A. Simulated emergency exercises
- B. Net operations
- C. Public service events
- D. Contesting**

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T8C04

Which of the following is good procedure when contacting another station in a contest?

- A. Sign only the last two letters of your call if there are many other stations calling
- B. Contact the station twice to be sure that you are in his log
- C. Send only the minimum information needed for proper identification and the contest exchange**
- D. All these choices are correct

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T8C05

What is a grid locator?

- A. A letter-number designator assigned to a geographic location**
- B. A letter-number designator assigned to an azimuth and elevation
- C. An instrument for neutralizing a final amplifier
- D. An instrument for radio direction finding

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T8C06

How is over the air access to IRLP nodes accomplished?

- A. By obtaining a password that is sent via voice to the node
- B. By using DTMF signals**
- C. By entering the proper internet password
- D. By using CTCSS tone codes

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T8C07

What is Voice Over Internet Protocol (VoIP)?

- A. A set of rules specifying how to identify your station when linked over the internet to another station
- B. A technique employed to "spot" DX stations via the internet
- C. A technique for measuring the modulation quality of a transmitter using remote sites monitored via the internet
- D. A method of delivering voice communications over the internet using digital techniques**

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T8C08

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 (VoIP)**
- B. A system for providing access to websites via amateur radio
- C. A system for informing amateurs in real time of the frequency of active DX stations
- D. A technique for measuring signal strength of an amateur transmitter via the internet

T8C09

Which of the following protocols enables an amateur station to transmit through a repeater without using a radio to initiate the transmission?

- A. IRLP
- B. D-STAR
- C. DMR
- D. EchoLink

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T8C10

What is required before using the EchoLink system?

- A. Complete the required EchoLink training
- B. Purchase a license to use the EchoLink software
- C. Register your call sign and provide proof of license
- D. All these choices are correct

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T8C11

What is an amateur radio station that connects other amateur stations to the internet?

- A. A gateway
- B. A repeater
- C. A digipeater
- D. A beacon

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T8D – Non-voice and digital communications: image signals and definition of NTSC, CW, packet radio, PSK, APRS, error detection and correction, amateur radio networking, Digital Mobile Radio, WSJT modes, Broadband-Hamnet

T8D01

Which of the following is a digital communications mode?

- A. Packet radio
- B. IEEE 802.11
- C. FT8
- D. All these choices are correct

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T8D02

What is a “talkgroup” on a DMR repeater?

- A. A group of operators sharing common interests
- B. A way for groups of users to share a channel at different times without hearing other users on the channel
- C. A protocol that increases the signal-to-noise ratio when multiple repeaters are linked together
- D. A net that meets at a specified time

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T8D03

What kind of data can be transmitted by APRS?

- A. GPS position data
- B. Text messages
- C. Weather data
- D. All these choices are correct

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T8D04

What type of transmission is indicated by the term "NTSC?"

- A. A Normal Transmission mode in Static Circuit
- B. A special mode for satellite uplink
- C. An analog fast-scan color TV signal
- D. A frame compression scheme for TV signals

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T8D05

Which of the following is an application of APRS?

- A. Providing real-time tactical digital communications in conjunction with a map showing the locations of stations
- B. Showing automatically the number of packets transmitted via PACTOR during a specific time interval
- C. Providing voice over internet connection between repeaters
- D. Providing information on the number of stations signed into a repeater

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T8D06

What does the abbreviation "PSK" mean?

- A. Pulse Shift Keying
- B. Phase Shift Keying
- C. Packet Short Keying
- D. Phased Slide Keying

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T8D07

Which of the following describes DMR?

- A. A technique for time-multiplexing two digital voice signals on a single 12.5 kHz repeater channel
- B. An automatic position tracking mode for FM mobiles communicating through repeaters
- C. An automatic computer logging technique for hands-off logging when communicating while operating a vehicle
- D. A digital technique for transmitting on two repeater inputs simultaneously for automatic error correction

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T8D08

Which of the following is included in packet radio transmissions?

- A. A check sum that permits error detection
- B. A header that contains the call sign of the station to which the information is being sent
- C. Automatic repeat request in case of error
- D. All these choices are correct

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T8D09

What is CW?

- A. A type of electromagnetic propagation
- B. A digital mode used primarily on 2 meter FM
- C. A technique for coil winding
- D. Another name for a Morse code transmission

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T8D10

Which of the following operating activities is supported by digital mode software in the WSJT-X software suite?

- A. Earth-Moon-Earth
- B. Weak signal propagation beacons
- C. Meteor scatter
- D. All these choices are correct

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T8D11

What is an ARQ transmission system?

- A. A special transmission format limited to video signals
- B. A system used to encrypt command signals to an amateur radio satellite
- C. An error correction method in which the receiving station detects errors and sends a request for retransmission
- D. A method of compressing data using autonomous reiterative Q codes prior to final encoding

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T8D12

Which of the following best describes an amateur radio mesh network?

- A. An amateur-radio based data network using commercial Wi-Fi equipment with modified firmware
- B. A wide-bandwidth digital voice mode employing DMR protocols
- C. A satellite communications network using modified commercial satellite TV hardware
- D. An internet linking protocol used to network repeaters

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T8D13

What is FT8?

- A. A wideband FM voice mode
- B. A digital mode capable of low signal-to-noise operation
- C. An eight channel multiplex mode for FM repeaters
- D. A digital slow-scan TV mode with forward error correction and automatic color compensation