

FCC Exam Element 3 Question Pool for General Class
Effective 7/1/2019 – 6/30/2023

SUBELEMENT G8 – SIGNALS AND EMISSIONS [3 Exam Questions – 3 Groups]

G8A – Carriers and modulation: AM; FM; single sideband; modulation envelope; digital modulation; overmodulation

G8A01

How is an FSK signal generated?

- A. By keying an FM transmitter with a sub-audible tone
- B. By changing an oscillator's frequency directly with a digital control signal**
- C. By using a transceiver's computer data interface protocol to change frequencies
- D. By reconfiguring the CW keying input to act as a tone generator

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G8A02

What is the name of the process that changes the phase angle of an RF signal to convey information?

- A. Phase convolution
- B. Phase modulation**
- C. Phase transformation
- D. Phase inversion

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G8A03

What is the name of the process that changes the instantaneous frequency of an RF wave to convey information?

- A. Frequency convolution
- B. Frequency transformation
- C. Frequency conversion
- D. Frequency modulation**

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G8A04

What emission is produced by a reactance modulator connected to a transmitter RF amplifier stage?

- A. Multiplex modulation
- B. Phase modulation**
- C. Amplitude modulation
- D. Pulse modulation

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G8A05

What type of modulation varies the instantaneous power level of the RF signal?

- A. Frequency shift keying
- B. Phase modulation
- C. Frequency modulation
- D. Amplitude modulation

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G8A06

Which of the following is characteristic of QPSK31?

- A. It is sideband sensitive
- B. Its encoding provides error correction
- C. Its bandwidth is approximately the same as BPSK31
- D. All these choices are correct

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G8A07

Which of the following phone emissions uses the narrowest bandwidth?

- A. Single sideband
- B. Double sideband
- C. Phase modulation
- D. Frequency modulation

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G8A08

Which of the following is an effect of overmodulation?

- A. Insufficient audio
- B. Insufficient bandwidth
- C. Frequency drift
- D. Excessive bandwidth

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G8A09

What type of modulation is used by the FT8 digital mode?

- A. 8-tone frequency shift keying
- B. Vestigial sideband
- C. Amplitude compressed AM
- D. Direct sequence spread spectrum

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G8A10

What is meant by the term “flat-topping,” when referring to a single sideband phone transmission?

- A. Signal distortion caused by insufficient collector current
- B. The transmitter’s automatic level control (ALC) is properly adjusted
- C. Signal distortion caused by excessive drive
- D. The transmitter’s carrier is properly suppressed

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G8A11

What is the modulation envelope of an AM signal?

- A. The waveform created by connecting the peak values of the modulated signal
- B. The carrier frequency that contains the signal
- C. Spurious signals that envelop nearby frequencies
- D. The bandwidth of the modulated signal

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G8A12

Which of the following narrow-band digital modes can receive signals with very low signal-to-noise ratios?

- A. MSK144
- B. FT8
- C. AMTOR
- D. MFSK32

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G8B – Frequency mixing; multiplication; bandwidths of various modes; deviation; duty cycle; intermodulation

G8B01

Which mixer input is varied or tuned to convert signals of different frequencies to an intermediate frequency (IF)?

- A. Image frequency
- B. Local oscillator
- C. RF input
- D. Beat frequency oscillator

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G8B02

If a receiver mixes a 13.800 MHz VFO with a 14.255 MHz received signal to produce a 455 kHz intermediate frequency (IF) signal, what type of interference will a 13.345 MHz signal produce in the receiver?

- A. Quadrature noise
- B. Image response**
- C. Mixer interference
- D. Intermediate interference

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G8B03

What is another term for the mixing of two RF signals?

- A. Heterodyning**
- B. Synthesizing
- C. Cancellation
- D. Phase inverting

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G8B04

What is the stage in a VHF FM transmitter that generates a harmonic of a lower frequency signal to reach the desired operating frequency?

- A. Mixer
- B. Reactance modulator
- C. Pre-emphasis network
- D. Multiplier**

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G8B05

What is the approximate bandwidth of a PACTOR-III signal at maximum data rate?

- A. 31.5 Hz
- B. 500 Hz
- C. 1800 Hz
- D. 2300 Hz**

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G8B06

What is the total bandwidth of an FM phone transmission having 5 kHz deviation and 3 kHz modulating frequency?

- A. 3 kHz
- B. 5 kHz
- C. 8 kHz
- D. 16 kHz**

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G8B07

What is the frequency deviation for a 12.21 MHz reactance modulated oscillator in a 5 kHz deviation, 146.52 MHz FM phone transmitter?

- A. 101.75 Hz
- B. 416.7 Hz
- C. 5 kHz
- D. 60 kHz

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G8B08

Why is it important to know the duty cycle of the mode you are using when transmitting?

- A. To aid in tuning your transmitter
- B. Some modes have high duty cycles that could exceed the transmitter's average power rating
- C. To allow time for the other station to break in during a transmission
- D. The attenuator will have to be adjusted accordingly

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G8B09

Why is it good to match receiver bandwidth to the bandwidth of the operating mode?

- A. It is required by FCC rules
- B. It minimizes power consumption in the receiver
- C. It improves impedance matching of the antenna
- D. It results in the best signal-to-noise ratio

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G8B10

What is the relationship between transmitted symbol rate and bandwidth?

- A. Symbol rate and bandwidth are not related
- B. Higher symbol rates require wider bandwidth
- C. Lower symbol rates require wider bandwidth
- D. Bandwidth is always half the symbol rate

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G8B11

What combination of a mixer's Local Oscillator (LO) and RF input frequencies is found in the output?

- A. The ratio
- B. The average
- C. The sum and difference
- D. The arithmetic product

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G8B12

What process combines two signals in a non-linear circuit or connection to produce unwanted spurious outputs?

- A. Intermodulation
- B. Heterodyning
- C. Detection
- D. Rolloff

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G8C – Digital emission modes

G8C01

On what band do amateurs share channels with the unlicensed Wi-Fi service?

- A. 432 MHz
- B. 902 MHz
- C. 2.4 GHz
- D. 10.7 GHz

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G8C02

Which digital mode is used as a low-power beacon for assessing HF propagation?

- A. WSPR
- B. Olivia
- C. PSK31
- D. SSB-SC

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G8C03

What part of a packet radio frame contains the routing and handling information?

- A. Directory
- B. Preamble
- C. Header
- D. Footer

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G8C04

Which of the following describes Baudot code?

- A. A 7-bit code with start, stop, and parity bits
- B. A code using error detection and correction
- C. A 5-bit code with additional start and stop bits
- D. A code using SELCAL and LISTEN

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G8C05

In the PACTOR protocol, what is meant by a NAK response to a transmitted packet?

- A. The receiver is requesting the packet be retransmitted
- B. The receiver is reporting the packet was received without error
- C. The receiver is busy decoding the packet
- D. The entire file has been received correctly

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G8C06

What action results from a failure to exchange information due to excessive transmission attempts when using PACTOR or WINMOR?

- A. The checksum overflows
- B. The connection is dropped
- C. Packets will be routed incorrectly
- D. Encoding reverts to the default character set

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G8C07

How does the receiving station respond to an ARQ data mode packet containing errors?

- A. It terminates the contact
- B. It requests the packet be retransmitted
- C. It sends the packet back to the transmitting station
- D. It requests a change in transmitting protocol

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G8C08

Which of the following statements is true about PSK31?

- A. Upper case letters are sent with more power
- B. Upper case letters use longer Varicode bit sequences and thus slow down transmission
- C. Error correction is used to ensure accurate message reception
- D. Higher power is needed as compared to RTTY for similar error rates

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G8C09

What does the number 31 represent in "PSK31"?

- A. The approximate transmitted symbol rate
- B. The version of the PSK protocol
- C. The year in which PSK31 was invented
- D. The number of characters that can be represented by PSK31

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G8C10

How does forward error correction (FEC) allow the receiver to correct errors in received data packets?

- A. By controlling transmitter output power for optimum signal strength
- B. By using the Varicode character set
- C. By transmitting redundant information with the data
- D. By using a parity bit with each character

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G8C11

How are the two separate frequencies of a Frequency Shift Keyed (FSK) signal identified?

- A. Dot and dash
- B. On and off
- C. High and low
- D. Mark and space

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G8C12

Which type of code is used for sending characters in a PSK31 signal?

- A. Varicode
- B. Viterbi
- C. Volumetric
- D. Binary

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G8C13

What is indicated on a waterfall display by one or more vertical lines on either side of a digital signal?

- A. Long path propagation
- B. Backscatter propagation
- C. Insufficient modulation
- D. Overmodulation

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G8C14

Which of the following describes a waterfall display?

- A. Frequency is horizontal, signal strength is vertical, time is intensity
- B. Frequency is vertical, signal strength is intensity, time is horizontal
- C. Frequency is horizontal, signal strength is intensity, time is vertical
- D. Frequency is vertical, signal strength is horizontal, time is intensity

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