

Ham Amateur Radio Technician Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 - 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

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- 1. Which of the following factors determine the characteristic impedance of a parallel conductor feed line?**
 - A. The distance between the centers of the conductors and the radius of the conductors**
 - B. The length of the line and the frequency of operation**
 - C. The type of insulation used and the voltage rating**
 - D. The gauge of the conductors and the type of connectors**

- 2. What is the approximate length of the driven element of a Yagi antenna?**
 - A. 1/2 wavelength**
 - B. 1/4 wavelength**
 - C. 3/4 wavelength**
 - D. Full wavelength**

- 3. What standing wave ratio results from connecting a 50-ohm feed line to a 200-ohm resistive load?**
 - A. 2:1**
 - B. 3:1**
 - C. 4:1**
 - D. 5:1**

- 4. Which of the following would increase the bandwidth of a Yagi antenna?**
 - A. Larger-diameter elements**
 - B. Shorter elements**
 - C. Higher gain**
 - D. Using a longer boom**

- 5. Why is an impedance matching transformer used at a transmitter output?**
 - A. To increase power output**
 - B. To reduce noise**
 - C. To present the desired impedance to the transmitter and feed line**
 - D. To filter unwanted signals**

- 6. When is an analog multimeter preferred to a digital multimeter?**
- A. When measuring RF signals**
 - B. When adjusting circuits for maximum or minimum values**
 - C. When working in high-voltage environments**
 - D. When performing frequency analysis**
- 7. Which of the following components should be added to a capacitor to increase the capacitance?**
- A. An inductor in series**
 - B. A resistor in parallel**
 - C. A capacitor in parallel**
 - D. A diode in series**
- 8. Until an upgrade to General class is shown in the FCC database, when must a Technician licensee identify with "AG" after their call sign?**
- A. Whenever they operate on any frequency**
 - B. Whenever they operate using General class frequency privileges**
 - C. Only during contesting events**
 - D. Only during emergency communications**
- 9. Which digital mode is known for its robustness against noise and interference?**
- A. P25**
 - B. SSB**
 - C. PSK31**
 - D. FT8**
- 10. Which of the following narrow-band digital modes can receive signals with very low signal-to-noise ratios?**
- A. PSK31**
 - B. FT8**
 - C. WSPR**
 - D. Psk63**

Answers

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1. A
2. A
3. C
4. A
5. C
6. B
7. C
8. B
9. D
10. B

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Explanations

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1. Which of the following factors determine the characteristic impedance of a parallel conductor feed line?

A. The distance between the centers of the conductors and the radius of the conductors

B. The length of the line and the frequency of operation

C. The type of insulation used and the voltage rating

D. The gauge of the conductors and the type of connectors

The characteristic impedance of a parallel conductor feed line is primarily determined by the physical configuration of the conductors. The distance between the centers of the conductors affects how much electric field lines can interact between them, while the radius of the conductors influences the amount of capacitance and inductance in the feed line. This relationship can be described using the transmission line theory, particularly for parallel conductors, where the impedance is derived from the ratio of the inductance and capacitance per unit length of the line. As the distance between the conductors increases, the capacitance decreases, which increases the characteristic impedance. Conversely, a larger conductor radius will change the inductance and capacitance, affecting the impedance value. Other options refer to aspects that do not directly influence the characteristic impedance in the same way. For instance, the length of the line and frequency of operation influence how signals behave over that specific length and frequency but do not change the intrinsic impedance characteristics of the line itself. The type of insulation and voltage rating relate more to the dielectric properties and safety standards rather than impedance. Similarly, the gauge of the conductors and the type of connectors impact the overall performance and loss characteristics of the feed line but are not key factors in determining its characteristic impedance.

2. What is the approximate length of the driven element of a Yagi antenna?

A. 1/2 wavelength

B. 1/4 wavelength

C. 3/4 wavelength

D. Full wavelength

The driven element of a Yagi antenna is typically designed to be about 1/2 wavelength long. This length is chosen because it optimally resonates at the frequency of operation, allowing the antenna to effectively convert electrical energy into radio waves and vice versa. A 1/2 wavelength element can efficiently radiate the energy fed to it, making it a critical component for achieving good performance in terms of gain and directivity. While other lengths such as 1/4 wavelength or full wavelength are used in different types of antennas for varying applications, they are not standard for the driven element in a Yagi configuration. The 3/4 wavelength is also not utilized for the driven element, as it doesn't provide the optimal balance of impedance and radiation characteristics required for maximum efficiency in a Yagi antenna design.

3. What standing wave ratio results from connecting a 50-ohm feed line to a 200-ohm resistive load?

- A. 2:1
- B. 3:1
- C. 4:1**
- D. 5:1

The standing wave ratio (SWR) is a measure of impedance matching between the transmission line and the load connected to it, which affects how much power is reflected back to the source rather than being transmitted to the load. In this scenario, we have a 50-ohm feed line connected to a 200-ohm resistive load. To calculate the SWR, we use the formula: $SWR = \frac{Z_L}{Z_0} + \frac{Z_0}{Z_L}$ where Z_L is the load impedance and Z_0 is the characteristic impedance of the feed line. Substituting the given values: $SWR = \frac{200}{50} + \frac{50}{200} = 4 + 0.25 = 4.25$ For practical purposes, the SWR is often rounded to a more convenient ratio. With a calculated value of 4.25, this roughly corresponds to a SWR of 4:1, indicating that when the load impedance differs significantly from the feed line's characteristic impedance, the standing wave ratio increases. This means that the correct answer reflects that higher impedance mismatch leads to

4. Which of the following would increase the bandwidth of a Yagi antenna?

- A. Larger-diameter elements**
- B. Shorter elements
- C. Higher gain
- D. Using a longer boom

Increasing the bandwidth of a Yagi antenna can indeed be achieved by using larger-diameter elements. When the diameter of the elements is increased, the Q factor of the antenna is decreased. A lower Q factor results in a broader resonance curve, which translates to increased bandwidth. This effect occurs because the larger elements allow for better coupling and reduced reactance, thereby smoothing out the frequency response. While shorter elements, higher gain, and a longer boom all have their benefits in terms of directing the antenna's gain and improving performance at certain frequencies, they do not directly enhance the bandwidth in the same way that larger-diameter elements do. Shorter elements can lead to narrower bandwidth, and while higher gain may come from optimal element lengths, it does not specifically address bandwidth improvement. A longer boom primarily affects gain and directional characteristics rather than directly influencing the bandwidth.

5. Why is an impedance matching transformer used at a transmitter output?

- A. To increase power output**
- B. To reduce noise**
- C. To present the desired impedance to the transmitter and feed line**
- D. To filter unwanted signals**

An impedance matching transformer is utilized at a transmitter output primarily to present the desired impedance to the transmitter and feed line. This is crucial because transmitters are designed to operate optimally with a specific load impedance, typically 50 ohms in most amateur radio applications. When the impedance of the transmission line and the antenna do not match the transmitter's output impedance, it can lead to signal reflection, inefficient power transfer, and potential damage to the transmitter due to high standing wave ratios (SWR). By using an impedance matching transformer, the effective transmission line impedance can be transformed to match the transmitter's output impedance. This ensures that maximum power is delivered to the antenna system, enhances the overall efficiency of the transmission, and minimizes reflections that can degrade the communication quality. While enhancing power output, reducing noise, and filtering unwanted signals are all important aspects of radio operation, they are not the primary role of an impedance matching transformer. Instead, the transformer's main function is to ensure proper impedance matching, thereby facilitating a more robust and effective communication link.

6. When is an analog multimeter preferred to a digital multimeter?

- A. When measuring RF signals**
- B. When adjusting circuits for maximum or minimum values**
- C. When working in high-voltage environments**
- D. When performing frequency analysis**

An analog multimeter is particularly preferred when adjusting circuits for maximum or minimum values due to its ability to provide a continuous, real-time visual representation of a changing voltage or current. This can help in identifying peak or lowest values more effectively than digital multimeters, which may display readings in discrete intervals and have a slower response time. Using an analog multimeter in this context allows the user to see fluctuations and trends in measurements more fluidly. The needle movement on the dial can give immediate feedback on the circuit adjustments, making it easier to fine-tune settings to achieve optimal performance. The smooth and instantaneous response of the analog device aids in sensitive adjustments, especially when maximum or minimum values must be determined during circuit tuning. While other types of measurements such as RF signals, high-voltage environments, or frequency analysis might sometimes call for specific features offered by digital multimeters, the real-time analog playback is most beneficial when fine-tuning a circuit. This characteristic of analog multimeters makes them particularly useful in scenarios where precision adjustments are necessary.

7. Which of the following components should be added to a capacitor to increase the capacitance?

- A. An inductor in series**
- B. A resistor in parallel**
- C. A capacitor in parallel**
- D. A diode in series**

To increase the total capacitance in a circuit, adding a capacitor in parallel is the correct approach. When capacitors are connected in parallel, their capacitances add together. This means that the effective capacitance of the circuit is the sum of the individual capacitances, which results in a larger total capacitance. For example, if you have two capacitors, one with a capacitance of 2 microfarads and another with 3 microfarads connected in parallel, the total capacitance would be 5 microfarads. This property is leveraged in various applications where higher capacitance is required, such as in power supply filters or coupling capacitors. In contrast, connecting capacitors in series results in a lower total capacitance because the effective capacitance is calculated using the formula for combined capacitance in series, which is less than the capacitance of any individual capacitor. Therefore, while adding other components like resistors, inductors, or diodes might change how the circuit behaves, they do not serve to increase capacitance. In summary, adding a capacitor in parallel is the definitive way to increase the total capacitance in a circuit, making it the correct choice for this question.

8. Until an upgrade to General class is shown in the FCC database, when must a Technician licensee identify with "AG" after their call sign?

- A. Whenever they operate on any frequency**
- B. Whenever they operate using General class frequency privileges**
- C. Only during contesting events**
- D. Only during emergency communications**

The requirement for a Technician licensee to identify with "AG" after their call sign is specifically tied to the privileges they are using. When a Technician operator passes the General class exam but has not yet had their upgrade processed and reflected in the FCC database, they may still be operating under General class frequency privileges. To indicate that they are operating on those frequencies, they must identify as "AG," which signifies they are an Amateur Radio operator who has passed the General class exam but is not yet officially recognized as one due to the delay in the database update. This identification is essential to maintain proper adherence to FCC regulations and to inform other operators of the licensee's current operating status. Using "AG" only when operating under these specific privileges keeps the communication clear and compliant, contrasting with situations where that designation would not be necessary, such as during contests or emergencies, where no identification would occur simply based on the activities' nature.

9. Which digital mode is known for its robustness against noise and interference?

- A. P25**
- B. SSB**
- C. PSK31**
- D. FT8**

FT8 is recognized for its robustness against noise and interference due to its design and the way it processes signals. This digital mode utilizes a technique called Forward Error Correction (FEC), which helps in recovering the original message even when parts of the data are lost or degraded due to poor signal conditions. FT8 operates using short 15-second transmission intervals, which allows it to efficiently decode signals that may be buried under noise or other unwanted signals. Additionally, FT8 makes use of a highly efficient modulation scheme that encodes the information across multiple frequency tones. This spread of information helps the signals withstand various forms of interference that may be present in the operating environment. As a consequence, operators can successfully complete contacts even under challenging conditions, making FT8 particularly popular for weak signal work. In contrast, other digital modes or voice communications may not possess the same level of resilience against adverse conditions. For example, while PSK31 has some robustness, it typically requires a stronger signal for successful decoding compared to FT8. Similarly, systems like P25 are designed primarily for secure communication rather than maximizing performance in noisy environments, and SSB (Single Sideband) relies on the operator's ability to adjust the signal for clarity, which can be more challenging in the presence

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

- A. PSK31**
- B. FT8**
- C. WSPR**
- D. Psk63**

FT8 is a narrow-band digital mode specifically designed for weak signal communication and performs exceptionally well in low signal-to-noise ratio conditions. It uses advanced error correction and encoding techniques, allowing operators to decode signals even when they are barely above the noise floor. FT8 transmits data in short bursts, which is effective in capturing brief signals and minimizing the effects of noise. This mode's design enables it to make connections under challenging conditions, such as during poor propagation or when interference is present, thereby allowing amateur radio operators to communicate effectively even when conditions are less than ideal. While other modes like PSK31 and WSPR also have their own strengths, FT8's efficiency and robustness against noise make it particularly effective for receiving faint signals, which aligns with the requirement outlined in the question.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

<https://ham.examzify.com>

We wish you the very best on your exam journey. You've got this!

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