Associate Certified Electronic Technician Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. **Doubling the power in a transmitter output signal results in what gain in dB?**
   - **A. 1 dB**
   - **B. 3 dB**
   - **C. 6 dB**
   - **D. 10 dB**

2. **In an LCD, by how many degrees does the fluid rotate the polarized light?**
   - **A. 60 degrees**
   - **B. 90 degrees**
   - **C. 120 degrees**
   - **D. 180 degrees**

3. **What is the primary function of a Digital Storage Oscilloscope?**
   - **A. To provide a continuous analog output**
   - **B. To allow close analysis of signals using micro processing and memory**
   - **C. To amplify electromagnetic signals**
   - **D. To generate electrical frequencies**

4. **What is the result of adding the binary numbers 101011 and 001110?**
   - **A. 100001**
   - **B. 111001**
   - **C. 110101**
   - **D. 110111**

5. **Which of the following is most commonly used to measure electrical current?**
   - **A. Voltmeter**
   - **B. Ammeter**
   - **C. Ohmmeter**
   - **D. Multimeter**

6. What happens to an LED when current flows in the reverse direction?

A. It glows brightly.

B. It remains off.

C. It burns out immediately.

D. It flickers

7. It is desired to raise the power to a speaker from 15 W to 30 W. This is a:

A. 1 dB increase

B. 5 dB increase

C. 3 dB increase

D. 10 dB increase

8. Which of the following accurately describes schematic diagrams of electronic devices?

A. They include detailed part lists.

B. They represent signal paths.

C. They show physical layout.

D. They indicate electrical safety ratings.

9. A differential amplifier whose two input signals are equal, but 180 degrees out of phase, will have a/an _____ output signal.

A. minimum

B. zero

C. maximum

D. negative

10. What type of display would a Digital Multimeter (DMM) most likely have?

A. LCD

B. LED

C. Analog

D. OLED

Answers

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

Explanations

1. Doubling the power in a transmitter output signal results in what gain in dB?

A. 1 dB

B. 3 dB

C. 6 dB

D. 10 dB

Doubling the power of a transmitter output signal corresponds to an increase of 3 dB in terms of gain. This is derived from the formula used to convert power ratios into decibels, which is: $$\text{Gain (dB)} = 10 \times \log_{10}(\frac{P2}{P1})$$ In this case, if the power is doubled (meaning $P2 = 2 \times P1$), the formula becomes: $$\text{Gain (dB)} = 10 \times \log_{10}(2)$$ Calculating the logarithm of 2 gives approximately 0.301, and multiplying this by 10 results in about 3.01 dB. Therefore, we round this value to 3 dB. This concept is fundamental in telecommunications and electronics, where understanding gain in decibels helps in assessing the efficiency and performance of transmitters and other devices.

2. In an LCD, by how many degrees does the fluid rotate the polarized light?

A. 60 degrees

B. 90 degrees

C. 120 degrees

D. 180 degrees

In a liquid crystal display (LCD), the liquid crystals play a crucial role in modulating light through the effect of polarization. The primary mechanism involves the orientation of the liquid crystal molecules in response to an electric field, which influences how polarized light passes through the display. When polarized light encounters the liquid crystals, the fluid effectively rotates the polarization direction of the light. In standard configurations for LCDs, this rotation is typically at an angle of 90 degrees. This 90-degree twist is significant because it allows the light to become aligned with the second polarizer, which is oriented parallel to the altered light. Thus, when the light exits through the second polarizer, it can either be transmitted or blocked, depending on the state of the liquid crystals. Moreover, this fundamental behavior enables the display to create images by controlling areas of brightness and color. The 90-degree rotation can be observed in various types of LCD technologies, including twisted nematic (TN) displays, which are commonly used in consumer electronics. Understanding this critical aspect of how LCDs function is essential for anyone studying or working in the field of electronics and display technologies.

3. What is the primary function of a Digital Storage Oscilloscope?

A. To provide a continuous analog output

B. To allow close analysis of signals using micro processing and memory

C. To amplify electromagnetic signals

D. To generate electrical frequencies

The primary function of a Digital Storage Oscilloscope (DSO) is to allow close analysis of signals using micro processing and memory. This capability enables the DSO to capture and store waveform data for thorough examination. The use of digital processing provides advantages such as improved accuracy, enhanced measurement techniques, and the ability to analyze complex signals over time. The oscilloscope samples the incoming analog signals, converts them to digital form, and then stores the data in memory. This enables users to review and manipulate the waveforms, facilitating a deeper understanding of the characteristics and behaviors of the signals being measured. In comparison, while continuous analog output is a feature found in some types of oscilloscopes, it is not the primary role of a DSO. Amplifying electromagnetic signals is more aligned with the function of amplifiers, and generating electrical frequencies pertains to signal generators, which are different instruments altogether. Thus, the focus of the DSO on analysis through its digital processing power distinguishes its primary function clearly.

4. What is the result of adding the binary numbers 101011 and 001110?

A. 100001

B. 111001

C. 110101

D. 110111

To find the result of adding the binary numbers 101011 and 001110, you align the numbers as you would in decimal addition, starting from the least significant bit (rightmost side) and moving to the left, carrying over any values as necessary. When you perform the addition: 1. Starting from the right: - 1 + 0 = 1 2. Next column to the left: - 1 + 1 = 0, carry over 1 3. Next column to the left: - 1 + 1 + 1 (the carry) = 1, carry over 1 4. Next column to the left: - 0 + 1 + 1 (the carry) = 0, carry over 1 5. Next column to the left: - 1 + 0 + 1 (the carry) = 0, carry over 1 6. Last column (leftmost): - 1 + 0 + 1 (the carry) = 1 Putting it all together, from left to right, you get: Carried value: 1 Final result: 1 1 1 0

5. Which of the following is most commonly used to measure electrical current?

A. Voltmeter

B. Ammeter

C. Ohmmeter

D. Multimeter

The measurement of electrical current is most commonly done using an ammeter. An ammeter is specifically designed to measure the flow of electric charge in a circuit, typically expressed in amperes. When measuring current, it is crucial to connect the ammeter in series with the circuit component whose current you wish to measure. This configuration ensures that all the current flowing through that part of the circuit also flows through the ammeter, providing an accurate reading. Other instruments serve different purposes; for example, a voltmeter measures voltage across two points in a circuit and is designed to be connected in parallel. An ohmmeter is used to measure resistance in an electrical component, and a multimeter can perform multiple functions, including measuring voltage, current, and resistance, but it requires switching between these functions. While a multimeter can measure current, it is not the most commonly used device specifically for measuring current when a dedicated tool, like an ammeter, can provide quicker and more direct readings. Thus, the ammeter stands out as the standard instrument for current measurement in various electrical applications.

6. What happens to an LED when current flows in the reverse direction?

A. It glows brightly.

B. It remains off.

C. It burns out immediately.

D. It flickers

When current flows in the reverse direction through a light-emitting diode (LED), it typically remains off. LEDs are designed to allow current to flow in one direction only, known as the forward bias. In the reverse bias condition, very little current can flow, usually only a small leakage current. If this reverse voltage is within the manufacturer's rating, the LED will not emit light and will appear off. This characteristic prevents damage to the LED in typical applications, as they are generally tolerant of small reverse voltages up to a certain limit, known as the reverse breakdown voltage. If the reverse voltage exceeds this limit, there is a risk of breakdown, which could damage the LED and potentially cause it to burn out, but this is not the typical behavior under normal conditions. The LED's ability to remain off when reverse-biased is a fundamental property that distinguishes it from other components in a circuit.

7. It is desired to raise the power to a speaker from 15 W to 30 W. This is a:

A. 1 dB increase

B. 5 dB increase

C. 3 dB increase

D. 10 dB increase

To determine the increase in power needed to raise the output from 15 W to 30 W, the relevant formula involves the decibel (dB) scale, which is logarithmic in nature. The general formula for calculating the change in decibels based on power is: $$\Delta dB = 10 \cdot \log_{10}\left(\frac{P_2}{P_1}\right)$$ Where P_2 is the final power of 30 W and P_1 is the initial power of 15 W. Plugging in the values gives: $$\Delta dB = 10 \cdot \log_{10}\left(\frac{30}{15}\right) = 10 \cdot \log_{10}(2)$$ The logarithm of 2 is approximately 0.301, therefore: $$\Delta dB \approx 10 \cdot 0.301 = 3.01 \, dB$$ This value rounds to approximately 3 dB. An increase of 3 dB indicates that the power level has effectively doubled (in this case, from 15 W to 30 W), which

8. Which of the following accurately describes schematic diagrams of electronic devices?

A. They include detailed part lists.

B. They represent signal paths.

C. They show physical layout.

D. They indicate electrical safety ratings.

Schematic diagrams of electronic devices are primarily designed to represent the signal paths within the circuit. These diagrams illustrate the connections and relationships between components such as resistors, capacitors, diodes, and integrated circuits, highlighting how signals flow through the system. This representation is crucial for understanding how the device operates, diagnosing faults, and developing further designs based on existing circuits. In contrast to schematic diagrams, detailed part lists typically accompany other documentation, like assembly instructions, rather than being part of the schematic itself. Physical layout information is usually provided in board layout diagrams or assembly drawings, which focus on the physical arrangement of components rather than their electrical connections. Regarding electrical safety ratings, such specifications are often noted separately in technical documentation or certification reports, not within the schematic itself. Thus, the essence of schematic diagrams lies in their ability to clearly show how signals interact within the electronic device.

9. A differential amplifier whose two input signals are equal, but 180 degrees out of phase, will have a/an _____ output signal.

A. minimum

B. zero

C. maximum

D. negative

A differential amplifier is designed to amplify the difference between two input signals while minimizing the impact of any signals common to both inputs. When the two input signals are equal but 180 degrees out of phase, this means that one signal is the negative of the other. In this scenario, the differential amplifier will produce an output that reflects this phase difference. Since the amplifier is set to respond to the difference between the inputs, the output will be the highest possible level, as it effectively amplifies the maximum differential between the two signals. The equal magnitudes of the signals, combined with their opposing phases, lead to a situation where the output is maximized based on the design of the amplifier. This results in a large and distinctly positive or negative output, depending on the specific arrangement of the amplifier's circuitry and the conventional definitions of phase. Therefore, the output signal is classified as a maximum in terms of amplitude, indicating that the differential amplifier excels at amplifying the full differential available when the inputs are exactly opposite in phase.

10. What type of display would a Digital Multimeter (DMM) most likely have?

A. LCD

B. LED

C. Analog

D. OLED

A Digital Multimeter (DMM) most commonly features a Liquid Crystal Display (LCD) due to several advantages that this type of display offers. LCDs are energy-efficient and consume less power, making them ideal for battery-operated devices like DMMs. They also provide clear and easily readable measurements, which is crucial for technicians needing quick and accurate readings in various lighting conditions. Compared to other display types, LCDs have a wider operating temperature range, reliability, and longevity, contributing to the overall durability of a multimeter. While LED displays can be bright and clear, they often consume more power and are less common in portable measurement tools. Analog displays are less prevalent in modern DMMs as they require more moving parts and can be harder to read accurately compared to their digital counterparts. OLED displays, despite offering vibrant colors and deep contrast, are primarily used in more advanced or specialized devices due to higher production costs. Thus, the LCD remains the most practical choice for digital multimeters.