

Associate Certified Electronics Technician (CET) Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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SAMPLE

Questions

- 1. What is the function of polarizers in an LCD?**
 - A. To reflect light**
 - B. To absorb light**
 - C. To control light passage**
 - D. To enhance colors**
- 2. Doubling the power in a transmitter output signal results in how many dB gain?**
 - A. 1**
 - B. 3**
 - C. 6**
 - D. 10**
- 3. What is essential for the laminations used in the core of a transformer?**
 - A. They must be magnetic**
 - B. They must be thick**
 - C. They must be insulated from each other**
 - D. They must be in direct contact**
- 4. Which component is likely found in a DC motor speed control circuit?**
 - A. Resistor**
 - B. Inductor**
 - C. Diode**
 - D. Op-amp**
- 5. What frequency modulation (FM) primarily indicates in a signal?**
 - A. Signal amplitude changes**
 - B. Signal frequency changes**
 - C. Signal phase changes**
 - D. Signal wave changes**

6. Decimal 50 would appear as ____ in Hex.
- A. 32
 - B. 50
 - C. 64
 - D. 1E
7. A three input NAND gate with two low inputs and one high input results in which type of output?
- A. Low
 - B. High
 - C. Undefined
 - D. Variable
8. What is the effect of using a resistor instead of an inductor in a power supply pi filter?
- A. It reduces efficiency
 - B. It increases voltage
 - C. All of the above
 - D. None of the above
9. If it is desired to raise the power to a speaker from 15W to 30W, what is the increase in dB?
- A. 1 dB
 - B. 3 dB
 - C. 5 dB
 - D. 10 dB
10. Which specification is typically not a concern regarding wire conductors?
- A. Length
 - B. Gauge
 - C. Material
 - D. Insulation type

Answers

SAMPLE

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

SAMPLE

Explanations

1. What is the function of polarizers in an LCD?

- A. To reflect light
- B. To absorb light
- C. To control light passage**
- D. To enhance colors

Polarizers in an LCD (Liquid Crystal Display) play a crucial role in controlling the passage of light. An LCD is composed of liquid crystals sandwiched between two polarizing filters. The function of these polarizers is to allow light waves of a specific orientation to pass through while blocking light waves of other orientations. When light enters the LCD, the first polarizer filters the incoming light, allowing only polarized light to pass through. The liquid crystals can then manipulate this light based on the electric field applied to them, altering the orientation of the light waves. The second polarizer, aligned at a specific angle relative to the first, allows varying degrees of the light to pass depending on the liquid crystal state, thereby controlling the brightness and color displayed on the screen. By regulating how much light can pass through, polarizers are essential for creating images in an LCD without them, the display would not function properly, leading to a washed-out image. This process is fundamentally important for the operation of LCD technology, which is widely used in various electronic devices.

2. Doubling the power in a transmitter output signal results in how many dB gain?

- A. 1
- B. 3**
- C. 6
- D. 10

When discussing power levels in decibels (dB), it is important to understand the logarithmic nature of the dB measurement. Specifically, the formula for calculating gain in decibels when dealing with power is: $\text{Gain (dB)} = 10 \cdot \log_{10}\left(\frac{P_2}{P_1}\right)$. If we are doubling the power (meaning $P_2 = 2 \cdot P_1$), we can substitute this into the formula: $\text{Gain (dB)} = 10 \cdot \log_{10}(2)$. The logarithm of 2 (approximately 0.301) gives us: $\text{Gain (dB)} = 10 \cdot 0.301 \approx 3.01 \text{ dB}$. For practical purposes, we can round this to 3 dB. Thus, when the power output of a transmitter is doubled, it results in a gain of approximately 3 dB. This is a fundamental principle in electronics and telecommunications that helps in quantifying changes in power levels. The gain of 3 dB signifies that there is a

3. What is essential for the laminations used in the core of a transformer?

- A. They must be magnetic**
- B. They must be thick**
- C. They must be insulated from each other**
- D. They must be in direct contact**

The essential requirement for the laminations used in the core of a transformer is that they must be insulated from each other. This insulation minimizes eddy current losses, which are currents that can arise within the core material due to the changing magnetic fields when the transformer operates. Eddy currents can lead to significant energy losses in the form of heat, reducing the overall efficiency of the transformer. By using insulated laminations, the design restricts these currents from circulating freely throughout the core. The thinner layers allow the magnetic field to pass through effectively while still preventing the larger eddy currents from forming. This design choice enhances the transformer's performance, improving its efficiency and functionality. The other options, while they relate to transformer operation to some extent, do not capture the critical need for insulation in the laminations. Laminations certainly need to be magnetic and of suitable material thickness, but without insulation, the core would suffer from increased energy losses due to eddy currents. Therefore, insulation is a fundamental aspect of transformer core design to ensure optimal performance.

4. Which component is likely found in a DC motor speed control circuit?

- A. Resistor**
- B. Inductor**
- C. Diode**
- D. Op-amp**

In a DC motor speed control circuit, an operational amplifier (op-amp) is commonly used for various control functions, such as regulating the speed of the motor by adjusting the voltage supplied to the motor based on feedback from the motor's speed. The op-amp can process input signals from sensors that detect speed and provide a controlled output to adjust the motor's drive level, ensuring the motor operates within desired parameters. The op-amp's ability to act as a comparator or to amplify signals makes it an excellent choice for precise control applications in DC motors. It helps in implementing feedback loops that are crucial for maintaining consistent performance under varying loads and speeds. While resistors, inductors, and diodes might also be present in various circuits, they serve different functions. Resistors can be used for current limiting, inductors may filter out voltage spikes, and diodes might protect the circuit from back EMF. However, the op-amp specifically plays a critical role in the feedback control necessary for effective speed regulation in a DC motor control circuit.

5. What frequency modulation (FM) primarily indicates in a signal?

- A. Signal amplitude changes**
- B. Signal frequency changes**
- C. Signal phase changes**
- D. Signal wave changes**

Frequency modulation (FM) primarily indicates changes in the frequency of the carrier signal as opposed to its amplitude or phase. In FM, information is encoded in the variations of the frequency, which means that as the amplitude of the modulating signal changes, the frequency of the carrier signal changes accordingly. This type of modulation is particularly beneficial for broadcasting and communication because it is more resilient to noise, making FM signals clearer and more stable than amplitude modulation (AM) signals. While other forms of modulation, such as amplitude modulation, focus on changing the strength of the signal, FM allows for fluctuations in frequency to correspond to the information being transmitted, resulting in high fidelity and reduced interference. The other options refer to different aspects of signal modulation. For example, amplitude changes reflect AM where the amplitude varies but frequency remains constant. Signal phase changes are related to phase modulation (PM), while signal wave changes are a broad and less specific description not limited to a particular modulation technique. Therefore, the focus on frequency changes accurately characterizes FM.

6. Decimal 50 would appear as ____ in Hex.

- A. 32**
- B. 50**
- C. 64**
- D. 1E**

To convert the decimal number 50 into hexadecimal, we start by dividing the number by 16, since hexadecimal is a base-16 system. When we divide 50 by 16, we get a quotient of 3, which represents the number of 16s that fit into 50. We then take the remainder of that division to get the component that contributes to the hexadecimal representation. In this case, 50 divided by 16 equals 3 with a remainder of 2. Thus, in hexadecimal, the quotient (3) is represented as '3', and the remainder (2) is represented as '2'. When combined, these give us the hexadecimal representation of 50 as '32'. Therefore, the correct conversion of decimal 50 into hexadecimal is '32', which aligns with the answer provided. This illustrates the method of converting decimal values to hexadecimal, showing the significance of both the quotient and the remainder in building the final hexadecimal result.

7. A three input NAND gate with two low inputs and one high input results in which type of output?

A. Low

B. High

C. Undefined

D. Variable

In a three-input NAND gate, the output is determined by the inputs according to the logic defined for NAND operation. A NAND gate produces a low output only when all its inputs are high. Conversely, if any input is low, the output will be high. In the scenario described, there are two low inputs and one high input. This means that not all inputs are high, which satisfies the conditions for the NAND function to yield a high output. Thus, regardless of how many inputs are high or low, as long as one input is low, the result of the NAND operation will always be a high output. The other answer options do not apply to this situation. A low output would only occur if all inputs were high, which is not the case here. Undefined is not applicable because the gate operates under defined logic rules. Variable would imply that the output could change between different states, but with a specific combination of inputs, the output is consistently high. Therefore, the correct output for the described conditions in a three-input NAND gate is high.

8. What is the effect of using a resistor instead of an inductor in a power supply pi filter?

A. It reduces efficiency

B. It increases voltage

C. All of the above

D. None of the above

Using a resistor instead of an inductor in a power supply pi filter indeed leads to several negative effects, which illustrates why the correct choice is that it reduces efficiency and potentially increases voltage. In a typical power supply pi filter, the inductor is used to smooth out the fluctuations in the rectified voltage. Inductors resist changes in current, thus they help to maintain a steady output voltage by filtering out ripple. When an inductor is replaced with a resistor, the ability to store energy and resist changes in current is lost. As a result, the filter's efficiency decreases because resistors dissipate energy in the form of heat, rather than storing it. This energy loss leads to less effective voltage regulation, which can manifest as an increase in the output voltage ripple. Therefore, the overall efficiency of the power supply is compromised, and the performance is not optimal compared to using an inductor. Thus, using a resistor negatively impacts both efficiency and voltage stability, confirming that selecting an inductor serves critical functions in this application that resistors cannot fulfill effectively.

9. If it is desired to raise the power to a speaker from 15W to 30W, what is the increase in dB?

A. 1 dB

B. 3 dB

C. 5 dB

D. 10 dB

To determine the increase in power in decibels (dB) when raising the power from 15W to 30W, it's important to understand the relationship between power and decibels. The formula for calculating the increase in dB when power is involved is: $\Delta \text{dB} = 10 \times \log_{10} \left(\frac{P_2}{P_1} \right)$ In this case, P_1 is the initial power (15W) and P_2 is the final power (30W). Plugging these values into the formula gives: $\Delta \text{dB} = 10 \times \log_{10} \left(\frac{30\text{W}}{15\text{W}} \right) = 10 \times \log_{10} (2)$ The logarithm base 10 of 2 is approximately 0.301, so calculating this: $\Delta \text{dB} = 10 \times 0.301 = 3.01$ Rounding this result indicates that the increase in power is approximately 3 dB. Therefore, raising the power from 15W

10. Which specification is typically not a concern regarding wire conductors?

A. Length

B. Gauge

C. Material

D. Insulation type

Length is typically not a primary concern regarding wire conductors when selecting appropriate specifications for most applications. While the length of a conductor can influence certain factors such as voltage drop over long distances, it is usually considered a secondary aspect compared to the other specifications. Gauge refers to the wire's thickness, which is crucial for determining its ability to carry current without overheating. A smaller gauge indicates a thicker wire that can handle higher currents, so this is a significant consideration. Material is another important specification, as different conductors (for example, copper vs. aluminum) have different electrical and thermal characteristics, including resistance and conductivity. The choice of material can significantly impact performance and efficiency. Insulation type plays a vital role in safety and performance as well, providing necessary protection against environmental factors and preventing electrical shorts. The choice of insulation determines how well the wire can withstand heat and physical stress, as well as its suitability for specific applications. Overall, while length does have an impact under certain conditions, the other specifications are generally more critical in ensuring effective and safe wiring applications.