

# Electrical Apprenticeship Test Questions And Answers

Code: AE10

ELECTRICAL ENGINEERING

$$\text{Therefore, } \Phi_1 / \Phi_2 = (E_{s1} / E_{s2}) \times (N_2 / N_1) \\ = (223.19 / 227.80) \times (1650 / 850) = 36826.35 / 19363$$

$$\Phi_1 / \Phi_2 = 1.90 / 1 = 19 / 10$$

$$\text{Therefore, change in flux } \Delta \Phi = (\Phi_1 - \Phi_2) / \Phi_1 \times 100 \\ = 9 / 19 \times 100 = 47.37\%$$

**Q.22** The power input to the rotor of a 3-phase, 50 Hz, 6 Pole induction motor is 80 kW. The rotor emf makes 100 complete alternations per minute. Find

(i) the slip (ii) the motor speed and (iii) the mechanical power developed by the motor. (10)

**Ans:**

Given  $P_i = 80 \text{ kW}$ ; 50Hz

$$P = 6$$

Rotor frequency  $f' = (100/60) = 5/3 = 1.67 \text{ Hz}$

$$S = f' / f = (5/3) / 50 = 0.033$$

$$\text{Mechanical Power developed by motor} = (1-S) P_i \\ = (1 - 1/30) \times 80 \text{ kW} = 77.33 \text{ kW}$$

**Q.23** The parameters of the equivalent circuit of a 150-kVA, 2400/240V transformer are:

$R_1 = 0.2 \text{ ohm}$ ,  $R_2 = 2 \times 10^{-3} \text{ ohm}$ ,  $X_1 = 0.45 \text{ ohm}$ ,  $X_2 = 4.5 \times 10^{-3} \text{ ohm}$ ,

$R_i = 10 \text{ kohm}$ ,  $X_m = 1.6 \text{ kohm}$  as seen from 2400 volts side.

Calculate:

(i) open circuit current, power and PF when LV side is excited at rated voltage. (8)

(ii) The voltage at which the HV side should be excited to conduct a short-circuit test (LV side) with full-load current flowing. What is the input power and its power factor? (8)

**Ans:** Given Rating = 150kVA  $\therefore P_o = 150 \text{ kVA}$

$$2400/240 \text{ V} \therefore V_2 = 2400 \text{ V}; V_1 = 240 \text{ V}$$

$$R_1 = 0.2 \Omega \quad X_1 = 0.45 \Omega$$

$$R_2 = 2 \times 10^{-3} \Omega \quad X_2 = 4.5 \times 10^{-3} \Omega$$

$$R_i = 10 \text{ k}\Omega \quad X_m = 1.6 \text{ k}\Omega$$

Find  $I_{20} = ?$ ,  $P_{20} = ?$ ,  $\cos \Phi_{20} = ?$ ,  
when L.V side is excited & H.V side is open circuit.

$I_{s1} = ?$ ,  $P_1 = ?$ ,  $\cos \Phi_1 = ?$ ,  
when H.V side is excited & short circuit at L.V side

**Electrical apprenticeship test questions and answers** are crucial for aspiring electricians to assess their knowledge and preparation for the field. These tests cover a wide range of topics, including electrical theory, safety practices, wiring methods, and code compliance. This article will provide a comprehensive overview of common electrical apprenticeship test questions, along with detailed answers and explanations to help candidates understand the material better.

## Understanding Electrical Apprenticeship Tests

Electrical apprenticeship tests are designed to evaluate the competency and readiness of candidates entering the electrical field. These tests often include multiple-choice questions, practical

assessments, and hands-on tasks that reflect real-world scenarios.

## **Purpose of the Tests**

- Assess Knowledge: Tests gauge the understanding of electrical principles, codes, and safety measures.
- Identify Skill Level: They help determine if candidates are prepared for the challenges of the apprenticeship.
- Certification: Passing these tests is often a requirement for obtaining certification or licensure.

## **Common Topics Covered in Electrical Apprenticeship Tests**

Understanding the main topics covered in electrical apprenticeship tests can help candidates focus their study efforts. Some of the key areas include:

1. Electrical Theory
  - Ohm's Law
  - Voltage, Current, and Resistance
  - Alternating Current (AC) vs. Direct Current (DC)
2. National Electrical Code (NEC)
  - Code compliance
  - Wiring methods
  - Grounding and bonding
3. Safety Practices
  - Personal protective equipment (PPE)
  - Lockout/tagout procedures
  - Hazardous material handling
4. Wiring and Circuit Design
  - Circuit components
  - Series and parallel circuits
  - Load calculations
5. Tools and Equipment
  - Common electrical tools
  - Testing equipment
  - Maintenance practices

## **Sample Questions and Answers**

Here are some sample questions along with their answers to give candidates an idea of what to

expect during the tests.

## Electrical Theory

Question 1: What is Ohm's Law?

- A)  $V = I \times R$
- B)  $P = I \times R$
- C)  $V = P \times R$
- D)  $I = V \times R$

Answer: A)  $V = I \times R$

Explanation: Ohm's Law states that the voltage (V) across a conductor is directly proportional to the current (I) flowing through it, with the resistance (R) being the factor of proportionality.

Question 2: If a circuit has 10 Ohms of resistance and a current of 2 Amps, what is the voltage?

Answer: Using Ohm's Law ( $V = I \times R$ ),  $V = 2 \text{ A} \times 10 \text{ } \Omega = 20 \text{ Volts}$ .

## National Electrical Code (NEC)

Question 3: What is the minimum depth for burying non-metallic underground conductors?

- A) 12 inches
- B) 18 inches
- C) 24 inches
- D) 30 inches

Answer: B) 18 inches

Explanation: According to NEC, non-metallic underground conductors must be buried at least 18 inches deep to protect them from physical damage.

Question 4: What is the primary purpose of grounding electrical systems?

- A) To reduce electrical resistance
- B) To prevent electrical shock
- C) To enhance circuit efficiency
- D) To increase voltage stability

Answer: B) To prevent electrical shock

Explanation: Grounding provides a safe path for electrical current to dissipate into the earth, reducing the risk of shock or electrocution.

## Safety Practices

Question 5: What does the term “lockout/tagout” refer to?

- A) A method for securing tools
- B) Procedures to ensure equipment is properly shut off
- C) A safety gear checklist
- D) A type of electrical circuit design

Answer: B) Procedures to ensure equipment is properly shut off

Explanation: Lockout/tagout procedures are safety measures used to ensure that machines are shut off and unable to be started up again until maintenance or servicing is completed.

Question 6: Which piece of personal protective equipment (PPE) is essential for electricians?

- A) Safety goggles
- B) Hard hats
- C) Insulated gloves
- D) All of the above

Answer: D) All of the above

Explanation: Electricians should wear safety goggles, hard hats, and insulated gloves to protect themselves from potential hazards while working.

## **Wiring and Circuit Design**

Question 7: In a series circuit, what happens to the total resistance when more resistors are added?

- A) It decreases
- B) It remains the same
- C) It increases
- D) It doubles

Answer: C) It increases

Explanation: In a series circuit, the total resistance increases as more resistors are added, because the current must pass through each resistor sequentially.

Question 8: Calculate the total load on a circuit with three devices that draw 5 Amps, 10 Amps, and 15 Amps.

Answer: Total load = 5 A + 10 A + 15 A = 30 Amps.

## **Tools and Equipment**

Question 9: What is the function of a multimeter?

- A) To measure current
- B) To measure voltage
- C) To measure resistance

- D) All of the above

Answer: D) All of the above

Explanation: A multimeter is a versatile tool that can measure voltage, current, and resistance in electrical circuits.

Question 10: Which tool is typically used to strip insulation from electrical wires?

- A) Pliers
- B) Wire strippers
- C) Screwdriver
- D) Hammer

Answer: B) Wire strippers

Explanation: Wire strippers are specifically designed to remove insulation from electrical wires without damaging the wire itself.

## Preparing for the Electrical Apprenticeship Test

To effectively prepare for the electrical apprenticeship test, candidates should consider the following strategies:

1. Study the NEC: Familiarize yourself with the National Electrical Code, as it is frequently referenced in tests.
2. Practice with Sample Questions: Utilize practice tests and sample questions to become comfortable with the format.
3. Hands-on Training: Engage in hands-on training whenever possible to reinforce theoretical knowledge with practical skills.
4. Join Study Groups: Collaborate with peers to discuss topics and quiz each other.
5. Seek Mentorship: Work with experienced electricians who can provide guidance and insights.

## Conclusion

Electrical apprenticeship test questions and answers serve as a foundation for aspiring electricians to gauge their knowledge and readiness for the field. By understanding the core topics and practicing with sample questions, candidates can build confidence and improve their chances of success. As the field of electrical work continues to evolve, staying informed about new technologies and regulations will be essential for a thriving career in this dynamic industry.

## Frequently Asked Questions

### What are the primary components of an electrical circuit?

The primary components of an electrical circuit include a power source (like a battery or generator),

conductors (wires), a load (like a light bulb or motor), and a switch.

## **What is the purpose of a circuit breaker?**

A circuit breaker is designed to protect an electrical circuit from damage caused by overload or a short circuit. It interrupts the flow of current when it detects a fault.

## **How do you calculate the total resistance in a series circuit?**

In a series circuit, the total resistance is calculated by summing all individual resistances:  $R_{\text{total}} = R_1 + R_2 + R_3 + \dots + R_n$ .

## **What is the difference between AC and DC current?**

AC (Alternating Current) changes direction periodically, while DC (Direct Current) flows in one direction only. AC is commonly used in household power systems, while DC is used in batteries.

## **What is Ohm's Law?**

Ohm's Law states that the current (I) through a conductor between two points is directly proportional to the voltage (V) across the two points and inversely proportional to the resistance (R):  $V = I \times R$ .

## **What safety precautions should be taken when working with electrical systems?**

Safety precautions include wearing appropriate personal protective equipment (PPE), ensuring the power is turned off before working on circuits, using insulated tools, and following lockout/tagout procedures.

## **What is a ground fault circuit interrupter (GFCI)?**

A GFCI is a device that cuts off electrical power when it detects an imbalance between incoming and outgoing current, helping to prevent electrical shock.

## **What are the color codes for electrical wiring?**

In the U.S., common color codes include black for hot wires, white for neutral, green or bare for ground, and red for secondary hot wires in 220-volt circuits.

## **How do you test for voltage using a multimeter?**

To test for voltage using a multimeter, set the multimeter to the appropriate voltage range, connect the probes to the circuit (black to ground and red to the point of interest), and read the measurement on the display.

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