**QUESTION BANK FOR 3 YEARS (2+1) D.A.E ELECTRICAL AUTOMATION TECHNOLOGY**

**Principles of Electrical Engineering (ET-115)**

1. **Which of the following is the unit of electrical resistance?**
   1. Ohm
   2. Volt
   3. Ampere
   4. Coulomb

Answer: a) Ohm

* **Explanation:** The ohm (symbol: Ω) is the SI unit of electrical resistance, representing the resistance between two points of a conductor when a constant potential difference of 1 volt applied produces a current of 1 ampere.

1. **In a purely resistive AC circuit, the current:**
2. Leads the voltage by 90 degrees
3. Lags the voltage by 90 degrees
4. Is in phase with the voltage
5. None of the above

Answer: c) Is in phase with the voltage

* **Explanation:** In a purely resistive AC circuit, the voltage and current are in phase, meaning they reach their maximum and minimum values at the same time.

1. **The power factor of an inductive load is:**
   1. Leading
   2. Lagging
   3. Unity
   4. Zero

Answer: b) Lagging

* **Explanation:** Inductive loads cause the current to lag behind the voltage, resulting in a lagging power factor.

1. **Which law states that the current through a conductor between two points is directly proportional to the voltage across the two points?**
   1. Ohm’s Law
   2. Kirchhoff’s Current Law
   3. Faraday’s Law
   4. Coulomb’s Law

Answer: a) Ohm’s Law

* **Explanation:** Ohm's Law states that V=IR, where V is voltage, I is current, and R is resistance, indicating a direct proportionality between voltage and current.

1. **Which of the following is a passive electrical component?**
   1. Transistor
   2. Diode
   3. Resistor
   4. Thyristor

Answer: c) Resistor

* **Explanation:** A resistor is a passive component that opposes the flow of current without needing any external power supply. Transistors and thyristors are active components.

1. **The phenomenon where a material expels magnetic fields when it becomes superconducting is called:**
   1. Meissner effect
   2. Joule effect
   3. Seebeck effect
   4. Peltier effect

Answer: a) Meissner effect

* **Explanation:** The Meissner effect is the expulsion of a magnetic field from a material when it transitions into the superconducting state.

1. **In a series RLC circuit at resonance, the impedance of the circuit is:**
   1. Equal to the resistance
   2. Equal to the inductive reactance
   3. Equal to the capacitive reactance
   4. Zero

Answer: a) Equal to the resistance

* **Explanation:** At resonance in a series RLC circuit, the inductive reactance and capacitive reactance cancel each other out, leaving the impedance equal to the resistance only.

1. **Which component is used to store electrical energy in an electric field?**
   1. Inductor
   2. Resistor
   3. Capacitor
   4. Transformer

Answer: c) Capacitor

* **Explanation:** A capacitor stores electrical energy in the form of an electric field between its plates when a voltage is applied across it.

1. **What is the form of energy conversion in a DC motor?**
   1. Electrical to mechanical
   2. Mechanical to electrical
   3. Thermal to electrical
   4. Electrical to thermal

Answer: a) Electrical to mechanical

* **Explanation:** A DC motor converts electrical energy into mechanical energy, enabling the motor to perform work like spinning a rotor.

1. **Kirchhoff’s Voltage Law (KVL) states that:**
   1. The sum of the voltages around a closed loop is zero
   2. The sum of the currents entering a junction is equal to the sum of the currents leaving the junction
   3. The total resistance in a series circuit is the sum of the individual resistances
   4. The power consumed in a circuit is equal to the product of the voltage and current

**Answer: a) The sum of the voltages around a closed loop is zero**

* **Explanation:** Kirchhoff’s Voltage Law (KVL) asserts that the algebraic sum of all voltages in a closed loop or mesh in a circuit is zero, reflecting the conservation of energy principle.

**Basic Electrical Drawing (ET 121)**

1. **What does a single-line diagram represent in electrical engineering?**
   * 1. Detailed circuit connections
     2. Simplified representation of an electrical system
     3. Physical layout of components
     4. 3D model of an electrical system

**Answer: b) Simplified representation of an electrical system**

**Explanation:** A single-line diagram provides a simplified notation for representing a complex electrical system, showing the components and connections with single lines and symbols.

1. **In electrical drawings, what symbol typically represents a resistor?**
   * 1. A zigzag line
     2. A straight line
     3. A circle
     4. A triangle

**Answer: a) A zigzag line**

**Explanation:** A zigzag line is the standard symbol for a resistor in electrical circuit diagrams, indicating resistance in the circuit.

1. **What is the purpose of a wiring diagram?**
   * 1. To show the physical connections and layout of an electrical system
     2. To calculate the electrical load
     3. To analyze circuit stability
     4. To show voltage and current waveforms

**Answer: a) To show the physical connections and layout of an electrical system**

**Explanation:** A wiring diagram details the physical connections and layout of an electrical system, helping in installation and troubleshooting.

1. **What does the symbol for a capacitor look like in an electrical diagram?**
   * 1. Two parallel lines
     2. A zigzag line
     3. A rectangle
     4. A triangle

**Answer: a) Two parallel lines**

**Explanation:** The symbol for a capacitor in electrical diagrams is typically two parallel lines, which represent the plates of the capacitor.

1. **In a schematic diagram, what does the symbol with an arrow pointing upwards from a horizontal line typically represent?**
   * 1. Ground
     2. Voltage source
     3. Inductor
     4. Diode

**Answer: a) Ground**

**Explanation:** The symbol with an arrow pointing upwards from a horizontal line usually represents a ground connection in a schematic diagram, indicating a reference point in the circuit.

1. **Which drawing is used to represent the electrical connections and functions of a specific circuit within a system?**
   * 1. Block diagram
     2. Schematic diagram
     3. Layout diagram
     4. Single-line diagram

**Answer: b) Schematic diagram**

**Explanation:** A schematic diagram is used to represent the electrical connections and functions of a specific circuit within a system, showing how the components are connected.

1. **What does a dotted line in an electrical drawing typically indicate?**
   * 1. Direct connection
     2. Mechanical linkage
     3. Future connection or optional part
     4. Insulation

**Answer: c) Future connection or optional part**

**Explanation:** A dotted line in an electrical drawing usually indicates a future connection or an optional part that may be added later.

1. **In electrical drawings, what does a triangle symbol typically represent?**
   * 1. Ground connection
     2. Transformer
     3. Amplifier or operational amplifier
     4. Resistor

**Answer: c) Amplifier or operational amplifier**

**Explanation:** A triangle symbol in electrical diagrams typically represents an amplifier or operational amplifier, indicating a device that increases the power of a signal.

1. **What is the main purpose of a block diagram?**
   * 1. To show the detailed circuit design
     2. To represent the major components and their interconnections
     3. To depict the physical layout of components
     4. To illustrate the electromagnetic field distribution

**Answer: b) To represent the major components and their interconnections**

**Explanation:** A block diagram is used to represent the major components of a system and their interconnections in a simplified form, providing an overview of the system’s structure.

1. **Which type of drawing is used to plan the installation of electrical systems in buildings?**
   * 1. Circuit diagram
     2. Wiring diagram
     3. Electrical layout plan
     4. Block diagram

**Answer: c) Electrical layout plan**

**Explanation:** An electrical layout plan is used to plan the installation of electrical systems in buildings, showing the placement of electrical components and wiring.

### Basic Electronics-I (ET-133)

1. **What is the main function of a diode in an electronic circuit?**
   * a) To amplify signals
   * b) To allow current to flow in one direction only
   * c) To store electrical energy
   * d) To resist the flow of current

**Answer: b) To allow current to flow in one direction only**

**Explanation:** A diode allows current to flow in one direction while blocking current in the opposite direction, functioning as a one-way valve for electric current.

1. **Which of the following is a semiconductor material commonly used in electronic devices?**
   * a) Copper
   * b) Aluminum
   * c) Silicon
   * d) Silver

**Answer: c) Silicon**

**Explanation:** Silicon is a widely used semiconductor material in electronic devices due to its excellent electrical properties and abundance.

1. **What does a transistor act as in an electronic circuit?**
   * a) A resistor
   * b) A capacitor
   * c) A switch or amplifier
   * d) A power supply

**Answer: c) A switch or amplifier**

**Explanation:** A transistor can act as a switch to turn current on and off, or as an amplifier to increase the power of a signal.

1. **What is the purpose of a capacitor in an electronic circuit?**
   * a) To allow current to flow in one direction only
   * b) To store and release electrical energy
   * c) To amplify signals
   * d) To provide resistance

**Answer: b) To store and release electrical energy**

**Explanation:** A capacitor stores electrical energy when connected to a power source and releases it when needed, providing a smoothing effect in circuits.

1. **What is the function of an inductor in an electronic circuit?**
   * a) To store electrical energy in an electric field
   * b) To resist changes in current flow
   * c) To convert AC to DC
   * d) To allow current to flow in one direction only

**Answer: b) To resist changes in current flow**

**Explanation:** An inductor stores energy in a magnetic field and resists changes in the current flowing through it, helping to filter and stabilize current in circuits.

1. **Which of the following components can be used to regulate voltage in an electronic circuit?**
   * a) Diode
   * b) Transistor
   * c) Zener diode
   * d) Inductor

**Answer: c) Zener diode**

**Explanation:** A Zener diode is used to regulate voltage by allowing current to flow in the reverse direction when a specific breakdown voltage is reached, thereby maintaining a stable output voltage.

1. **What does the term “biasing” refer to in the context of a transistor?**
   * a) The process of amplifying a signal
   * b) The process of storing electrical energy
   * c) The application of voltage to establish a reference operating point
   * d) The connection of a capacitor and resistor in parallel

**Answer: c) The application of voltage to establish a reference operating point**

**Explanation:** Biasing refers to the application of voltage to a transistor’s terminals to establish a stable operating point, ensuring the transistor functions correctly as a switch or amplifier.

1. **In a common emitter configuration of a transistor, what is the phase relationship between the input and output signals?**
   * a) In phase
   * b) 90 degrees out of phase
   * c) 180 degrees out of phase
   * d) 270 degrees out of phase

**Answer: c) 180 degrees out of phase**

**Explanation:** In a common emitter configuration, the input and output signals are 180 degrees out of phase, meaning when the input signal goes high, the output signal goes low, and vice versa.

1. **What is the primary purpose of a rectifier circuit?**
   * a) To amplify AC signals
   * b) To convert AC to DC
   * c) To filter noise from signals
   * d) To store electrical energy

**Answer: b) To convert AC to DC**

**Explanation:** A rectifier circuit converts alternating current (AC) to direct current (DC), providing a steady DC voltage for electronic devices.

1. **Which type of transistor is known for having higher electron mobility, leading to faster switching speeds?**
   * a) Bipolar Junction Transistor (BJT)
   * b) Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET)
   * c) Junction Field-Effect Transistor (JFET)
   * d) Schottky transistor

**Answer: b) Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET)**

**Explanation:** MOSFETs have higher electron mobility compared to BJTs, allowing for faster switching speeds and making them suitable for high-speed and high-frequency applications.

### Workshop Practice (Electrical Wiring) (ET-143)

1. **What is the primary purpose of a fuse in an electrical circuit?**
   * a) To regulate voltage
   * b) To convert AC to DC
   * c) To protect the circuit by breaking the connection in case of an overload
   * d) To amplify the current

**Answer: c) To protect the circuit by breaking the connection in case of an overload**

**Explanation:** A fuse is a safety device that interrupts the flow of current in an electrical circuit when the current exceeds a certain level, preventing damage to the circuit components.

1. **Which tool is used to strip the insulation from electrical wires?**
   * a) Multimeter
   * b) Wire stripper
   * c) Pliers
   * d) Soldering iron

**Answer: b) Wire stripper**

**Explanation:** A wire stripper is a hand tool used to remove the insulation from electrical wires, preparing them for connections or splicing.

1. **In electrical wiring, what is the color code for the neutral wire in most countries?**
   * a) Red
   * b) Black
   * c) Blue or white
   * d) Green

**Answer: c) Blue or white**

**Explanation:** In many countries, the neutral wire is typically colored blue (in Europe and other regions) or white (in the United States), helping to distinguish it from the live and ground wires.

1. **What is the function of a circuit breaker?**
   * a) To step up voltage
   * b) To allow current to flow in one direction
   * c) To automatically interrupt current flow in an overload or short circuit condition
   * d) To store electrical energy

**Answer: c) To automatically interrupt current flow in an overload or short circuit condition**

**Explanation:** A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit by interrupting current flow.

1. **Which type of conduit is commonly used for electrical wiring in industrial environments?**
   * a) Flexible metal conduit (FMC)
   * b) Non-metallic sheathed cable (NM)
   * c) Rigid metal conduit (RMC)
   * d) Armored cable (AC)

**Answer: c) Rigid metal conduit (RMC)**

**Explanation:** Rigid metal conduit (RMC) is commonly used in industrial environments due to its strength and ability to protect wires from physical damage and environmental hazards.

1. **What is the purpose of using a ground wire in electrical installations?**
   * a) To increase voltage
   * b) To provide a safe path for excess current to dissipate into the earth
   * c) To connect multiple circuits
   * d) To step down current

**Answer: b) To provide a safe path for excess current to dissipate into the earth**

**Explanation:** A ground wire provides a safe path for excess current to dissipate into the earth, preventing electric shocks and equipment damage.

1. **Which of the following is the correct sequence for wiring a standard 3-pin plug?**
   * a) Live, Neutral, Earth
   * b) Neutral, Live, Earth
   * c) Earth, Live, Neutral
   * d) Live, Earth, Neutral

**Answer: a) Live, Neutral, Earth**

**Explanation:** The correct wiring sequence for a standard 3-pin plug is Live (L), Neutral (N), and Earth (E), ensuring proper connection and safety.

1. **What is the typical color of the earth or ground wire in electrical installations?**
   * a) Red
   * b) Black
   * c) Green or green with yellow stripes
   * d) Blue

**Answer: c) Green or green with yellow stripes**

**Explanation:** The earth or ground wire is typically green or green with yellow stripes, providing a standardized color code for safety.

1. **Which tool is commonly used to test for the presence of voltage in an electrical circuit?**
   * a) Wire stripper
   * b) Multimeter
   * c) Soldering iron
   * d) Insulation tape

**Answer: b) Multimeter**

**Explanation:** A multimeter is a versatile tool used to measure voltage, current, and resistance in an electrical circuit, helping to diagnose and troubleshoot electrical issues.

1. **What safety measure should be taken before starting any electrical wiring work?**
   * a) Increase the voltage supply
   * b) Ensure all power sources are switched off and de-energized
   * c) Wear insulating gloves only
   * d) Connect all circuits in parallel

**Answer: b) Ensure all power sources are switched off and de-energized**

**Explanation:** Before starting any electrical wiring work, it is crucial to ensure that all power sources are switched off and the circuits are de-energized to prevent electric shock and accidents.

**Introduction to Computer Applications (Comp 122)**

1. **Which of the following is an example of an operating system?**

a) Microsoft Word

b) Google Chrome

c) Windows 10

d) Adobe Photoshop

**Answer: c) Windows 10**

**Explanation:** Windows 10 is an operating system that manages the hardware and software resources of a computer.

1. **What is the main purpose of a spreadsheet application?**

a) Creating presentations

b) Writing documents

c) Managing and analyzing data

d) Browsing the internet

**Answer: c) Managing and analyzing data**

**Explanation:** Spreadsheet applications like Microsoft Excel are used for managing and analyzing data through tables, formulas, and charts.

1. **Which of the following is not a type of computer software?**

a) Application software

b) System software

c) Utility software

d) Peripherals

**Answer: d) Peripherals**

**Explanation:** Peripherals are external devices connected to a computer, not a type of software.

1. **What does the term 'GUI' stand for in computing?**

a) General User Input

b) Graphical User Interface

c) Graphic Unit Interface

d) General Utility Interface

**Answer: b) Graphical User Interface**

**Explanation:** GUI stands for Graphical User Interface, which allows users to interact with electronic devices through graphical icons and visual indicators.

1. **Which of the following is used for creating multimedia presentations?**

a) Microsoft PowerPoint

b) Microsoft Word

c) Microsoft Excel

d) Microsoft Access

**Answer: a) Microsoft PowerPoint**

**Explanation:** Microsoft PowerPoint is a software application used for creating multimedia presentations consisting of slides.

1. **What is the primary function of database management software?**

a) To edit images

b) To manage and organize data

c) To browse the internet

d) To play video games

**Answer: b) To manage and organize data**

**Explanation:** Database management software, such as Microsoft Access, is used to store, retrieve, and manage data efficiently.

1. **Which of the following software is used for word processing?**

a) Microsoft Word

b) Adobe Illustrator

c) Google Chrome

d) VLC Media Player

**Answer: a) Microsoft Word**

**Explanation:** Microsoft Word is a word processing application used for creating, editing, and formatting text documents.

1. **Which of the following is a popular web browser?**

a) Adobe Acrobat

b) Mozilla Firefox

c) Windows Explorer

d) VLC Media Player

**Answer: b) Mozilla Firefox**

**Explanation:** Mozilla Firefox is a popular web browser used for accessing and navigating the internet.

1. **What does the term 'cloud computing' refer to?**

a) Storing data on physical devices

b) Accessing computing resources over the internet

c) Running applications on a local computer

d) Designing computer hardware

**Answer: b) Accessing computing resources over the internet**

**Explanation:** Cloud computing refers to the delivery of computing services, such as storage and processing power, over the internet.

1. **Which application is typically used for email communication?**

a) Microsoft Excel

b) Microsoft Outlook

c) Adobe Photoshop

d) Google Maps

**Answer: b) Microsoft Outlook**

**Explanation:** Microsoft Outlook is an email application used for sending, receiving, and organizing email communications.

### D.C. Machines & Batteries (ET 203)

1. **What is the primary function of a commutator in a DC machine?**
   * a) To convert AC to DC
   * b) To convert mechanical energy to electrical energy
   * c) To ensure unidirectional current flow in the armature winding
   * d) To increase the efficiency of the machine

**Answer: c) To ensure unidirectional current flow in the armature winding**

**Explanation:** The commutator in a DC machine is a rotary switch that reverses the direction of current flow through the armature windings, ensuring that the output current is unidirectional.

1. **Which type of DC motor is typically used in applications requiring high starting torque?**
   * a) Shunt motor
   * b) Series motor
   * c) Compound motor
   * d) Permanent magnet motor

**Answer: b) Series motor**

**Explanation:** Series DC motors are known for their high starting torque, making them suitable for applications like cranes and electric trains.

1. **What is the purpose of interpoles in a DC machine?**
   * a) To reduce armature reaction and improve commutation
   * b) To increase the efficiency of the machine
   * c) To provide additional field strength
   * d) To cool the machine

**Answer: a) To reduce armature reaction and improve commutation**

**Explanation:** Interpoles are small auxiliary poles placed between the main poles of a DC machine to reduce armature reaction and improve commutation by neutralizing the reactance voltage.

1. **In a lead-acid battery, what is the active material of the positive plate?**
   * a) Lead sulfate
   * b) Lead peroxide
   * c) Spongy lead
   * d) Sulfuric acid

**Answer: b) Lead peroxide**

**Explanation:** In a lead-acid battery, the active material of the positive plate is lead peroxide (PbO2), which participates in the electrochemical reactions during charging and discharging.

1. **Which factor does NOT affect the terminal voltage of a DC generator?**
   * a) Armature reaction
   * b) Load current
   * c) Speed of rotation
   * d) Type of commutator

**Answer: d) Type of commutator**

**Explanation:** The terminal voltage of a DC generator is influenced by armature reaction, load current, and speed of rotation, but not by the type of commutator used.

1. **What is the typical cause of sparking at the brushes in a DC machine?**
   * a) High armature resistance
   * b) Misalignment of brushes
   * c) Low field current
   * d) High supply voltage

**Answer: b) Misalignment of brushes**

**Explanation:** Sparking at the brushes in a DC machine is commonly caused by misalignment of the brushes, which disrupts proper commutation.

1. **What is the role of a rheostat in the field circuit of a DC shunt motor?**
   * a) To control armature current
   * b) To regulate field current and hence the speed
   * c) To increase the supply voltage
   * d) To decrease the load torque

**Answer: b) To regulate field current and hence the speed**

**Explanation:** A rheostat in the field circuit of a DC shunt motor is used to regulate the field current, which in turn controls the speed of the motor.

1. **What is the typical electrolyte used in a nickel-cadmium (Ni-Cd) battery?**
   * a) Sulfuric acid
   * b) Potassium hydroxide
   * c) Hydrochloric acid
   * d) Sodium chloride

**Answer: b) Potassium hydroxide**

**Explanation:** The electrolyte commonly used in nickel-cadmium (Ni-Cd) batteries is potassium hydroxide (KOH).

1. **Which type of DC generator is typically used for arc welding purposes?**
   * a) Series generator
   * b) Shunt generator
   * c) Compound generator
   * d) Permanent magnet generator

**Answer: a) Series generator**

**Explanation:** Series generators are often used for arc welding purposes due to their ability to provide a high current at relatively low voltage.

1. **In a DC motor, what is the effect of increasing the load on the motor?**
   * a) Speed increases
   * b) Speed decreases
   * c) Torque decreases
   * d) Voltage decreases

**Answer: b) Speed decreases**

**Explanation:** In a DC motor, increasing the load typically results in a decrease in speed because the motor needs to work harder to overcome the increased load torque.

### MCQs on Electrical Instruments & Measurements (ET 273)

1. **Which instrument is used to measure the resistance of an electrical component?**
   * a) Voltmeter
   * b) Ammeter
   * c) Ohmmeter
   * d) Wattmeter

**Answer: c) Ohmmeter**

**Explanation:** An ohmmeter is specifically designed to measure electrical resistance, providing a direct reading of the resistance value.

1. **What is the purpose of a multimeter?**
   * a) To measure voltage only
   * b) To measure current only
   * c) To measure voltage, current, and resistance
   * d) To measure power in a circuit

**Answer: c) To measure voltage, current, and resistance**

**Explanation:** A multimeter is a versatile instrument used to measure voltage, current, and resistance in electrical circuits. Also Knows as AVO Meter abbreviation of AVO is Ampere, Volt and Ohm respectively.

1. **Which instrument is used to measure alternating current (AC)?**
   * a) Ammeter
   * b) Voltmeter
   * c) Wattmeter
   * d) Oscilloscope

**Answer: a) Ammeter**

**Explanation:** An ammeter is used to measure the magnitude of alternating current (AC) flowing in a circuit.

1. **What does a galvanometer measure?**
   * a) Voltage
   * b) Current
   * c) Resistance
   * d) Magnetic field strength

**Answer: b) Current**

**Explanation:** A galvanometer is a sensitive instrument used to detect and measure electric current, typically in the form of a deflection on a scale.

1. **Which instrument is used to measure the power consumption of an electrical load?**
   * a) Ammeter
   * b) Voltmeter
   * c) Wattmeter
   * d) Ohmmeter

**Answer: c) Wattmeter**

**Explanation:** A wattmeter is specifically designed to measure electrical power consumption in watts, providing an indication of the rate of energy consumption by a load.

1. **What is the primary function of a shunt in an ammeter?**
   * a) To increase the range of current measurement
   * b) To measure voltage across a circuit
   * c) To measure resistance
   * d) To provide isolation from the circuit under test

**Answer: a) To increase the range of current measurement**

**Explanation:** A shunt in an ammeter is a low-resistance path connected in parallel to the meter, allowing it to measure high currents by diverting a portion of the current away from the meter.

1. **Which instrument is used to measure insulation resistance in electrical circuits?**
   * a) Megger
   * b) Multimeter
   * c) Oscilloscope
   * d) Tachometer

**Answer: a) Megger**

**Explanation:** A Megger (mega ohm), is specifically designed to measure insulation resistance in electrical circuits, helping to identify insulation faults and weaknesses.

1. **What does a tachometer measure?**
   * a) Voltage
   * b) Current
   * c) Frequency
   * d) Rotational speed

**Answer: d) Rotational speed**

**Explanation:** A tachometer is an instrument used to measure the rotational speed of a shaft or disk in machinery, typically displayed in revolutions per minute (RPM).

1. **Which instrument is used to measure the phase difference between two AC voltages or currents?**
   * a) Multimeter
   * b) Phase meter
   * c) Power analyzer
   * d) Oscilloscope

**Answer: b) Phase meter**

**Explanation:** A phase meter is specifically designed to measure the phase difference between two AC voltages or currents, providing information about the timing relationship between them.

1. **What does an earth tester measure?**
   * a) Earth's magnetic field
   * b) Earth's resistance
   * c) Earth's voltage
   * d) Earth's capacitance

**Answer: b) Earth's resistance**

**Explanation:** An earth tester is used to measure the resistance of the earth connection or ground in electrical installations, ensuring proper grounding for safety and equipment protection.

**AC Machine (ET 253)**

1. **Which type of AC machine is commonly used for high-power applications such as industrial drives and electric traction?**

* a) Synchronous machine
* b) Induction machine
* c) Transformer
* d) Capacitor-start motor

**Answer: b) Induction machine**

**Explanation:** Induction machines, including both induction motors and generators, are widely used for high-power applications due to their robustness, reliability, and cost-effectiveness.

1. **What is the primary function of a synchronous machine in a power system?**

* a) To convert electrical energy into mechanical energy
* b) To convert mechanical energy into electrical energy
* c) To provide reactive power support, regulate system voltage & improve PF
* d) To step up or step down voltage levels

**Answer: c) To provide reactive power support, regulate system voltage & improve PF**

**Explanation:** Synchronous machines in power systems help regulate voltage levels, provide reactive power support, and improve power factor by adjusting their excitation.

1. **In a synchronous generator, what is the relationship between the frequency of the generated voltage and the speed of rotation?**

* a) Directly proportional
* b) Inversely proportional
* c) Independent
* d) Linear

**Answer: a) Directly proportional**

**Explanation:** The frequency of the generated voltage in a synchronous generator is directly proportional to the speed of rotation, according to the relationship f = (P \* N) / 120, where f is the frequency in Hz, P is the number of poles, and N is the rotational speed in rpm.

1. **Which type of AC machine is commonly used as a voltage regulator in power systems and industrial applications?**

* a) Synchronous machine
* b) Induction machine
* c) Transformer
* d) DC machine

**Answer: a) Synchronous machine**

**Explanation:** Synchronous machines can be operated with a field winding connected to a DC source, allowing precise control of the generated voltage, making them suitable for voltage regulation applications.

1. **What is the primary function of the stator in an AC machine?**

* a) To induce voltage in the rotor
* b) To provide mechanical support to the rotor
* c) To produce a rotating magnetic field
* d) To control the speed of rotation

**Answer: c) To produce a rotating magnetic field**

**Explanation:** The stator in an AC machine is typically the stationary part that houses the field windings responsible for producing a rotating magnetic field, which interacts with the rotor to generate torque.

1. **In an induction motor, what is the relative speed between the stator magnetic field and the rotor?**

* a) Equal to rotor speed
* b) Equal to stator speed
* c) Zero
* d) Variable

**Answer: c) Zero**

**Explanation:** In an induction motor, the rotor speed always lags behind the synchronous speed of the stator magnetic field, resulting in a relative speed of zero in the ideal case of no slip.

1. **What is the function of the rotor in a synchronous machine?**

* a) To produce a rotating magnetic field
* b) To induce voltage in the stator
* c) To convert electrical energy into mechanical energy
* d) To follow the speed of the stator magnetic field

**Answer: d) To follow the speed of the stator magnetic field**

**Explanation:** The rotor in a synchronous machine rotates at the same speed as the stator magnetic field, whether it's induced by an external source or produced by the stator itself.

1. **Which type of AC machine requires slip rings and brushes for electrical connections to the rotor windings?**

* a) Induction machine
* b) Synchronous machine
* c) Transformer
* d) Capacitor-start motor

**Answer: a) Induction machine**

**Explanation:** Slip rings and brushes are commonly used in induction machines, particularly in **wound rotor induction motors**, for electrical connections to the rotor windings. This arrangement allows for external resistance control or additional rotor winding control, providing features like speed control and torque regulation

1. **What is the primary role of laminated magnetic core in a transformer?**

* a) To support the windings
* b) To induce voltage
* c) To reduce eddy current losses
* d) To provide mechanical strength

**Answer: c) To reduce eddy current losses**

**Explanation:** The magnetic core in a transformer is made of high-permeability material, such as laminated silicon steel, to provide a low-reluctance path for magnetic flux and minimize eddy current losses.

1. **In a three-phase induction motor, how many sets of windings are typically found in the stator?**

* a) One
* b) Two
* c) Three
* d) Four

**Answer: c) Three**

**Explanation:** In a three-phase induction motor, the stator typically contains three sets of windings, each connected to one phase of the AC power supply, producing a rotating magnetic field.

**Applications of Computers in Electrical Technology (ET 261)**

1. **Which of the following is a primary application of computers in electrical technology?**

a) Designing electrical circuits

b) Generating power from renewable sources

c) Conducting electrical safety tests

d) Monitoring and controlling industrial processes

**Answer: d) Monitoring and controlling industrial processes**

**Explanation:** Computers are extensively used in industrial settings to monitor and control various processes, including those related to electrical technology, such as manufacturing, power generation, and distribution.

1. **In electrical technology, what role does Computer-Aided Design (CAD) software primarily serve?**

a) Analyzing power distribution systems

b) Simulating electromagnetic fields

c) Automating circuit board design

d) Managing database systems

**Answer: c) Automating circuit board design**

**Explanation:** Computer-Aided Design (CAD) software automates the design process of electrical circuits and printed circuit boards (PCBs), improving efficiency and accuracy.

1. **Which software tool is commonly used for simulating and analyzing electrical circuits and systems?**

a) AutoCAD

b) MATLAB

c) Adobe Photoshop

d) Microsoft Excel

**Answer: b) MATLAB**

**Explanation:** MATLAB is a widely used software tool for simulating and analyzing electrical circuits and systems due to its powerful numerical computing capabilities.

1. **What is the main advantage of using Computer Numerical Control (CNC) systems in electrical technology?**

a) Increased safety in high-voltage environments

b) Precise control over machining processes

c) Reduction of electromagnetic interference

d) Enhanced insulation resistance

**Answer: b) Precise control over machining processes**

**Explanation:** Computer Numerical Control (CNC) systems allow for precise control and automation of machining processes, which is essential in electrical technology for manufacturing components and equipment.

1. **Which aspect of electrical technology benefits the most from computer-based modeling and simulation techniques?**

a) Transformer design

b) Lightning protection

c) Power system stability analysis

d) Electrical machine efficiency

**Answer: c) Power system stability analysis**

**Explanation:** Computer-based modeling and simulation techniques are crucial for analyzing and predicting the stability of power systems under various operating conditions, ensuring reliable operation.

1. **What is the primary function of Supervisory Control and Data Acquisition (SCADA) systems in electrical technology?**

a) Analyzing circuit faults

b) Monitoring and controlling remote equipment

c) Testing electrical insulation

d) Simulating power grid scenarios

**Answer: b) Monitoring and controlling remote equipment**

**Explanation:** Supervisory Control and Data Acquisition (SCADA) systems are used to monitor and control remote equipment, such as substations and power plants, in real-time.

1. **Which software tool is commonly used for programming and simulating programmable logic controllers (PLCs) in industrial automation?**

a) MATLAB

b) Python

c) Siemens TIA Portal

d) Microsoft Word

**Answer: c) Siemens TIA Portal**

**Explanation:** Siemens TIA Portal is a popular software tool for programming and simulating programmable logic controllers (PLCs) used in industrial automation, including electrical technology applications.

1. **What role does Geographic Information System (GIS) software play in electrical technology?**

a) Analyzing weather patterns for power generation

b) Mapping and managing electrical infrastructure

c) Simulating transient stability in power grids

d) Designing printed circuit boards

**Answer: b) Mapping and managing electrical infrastructure**

**Explanation:** Geographic Information System (GIS) software is used to map and manage electrical infrastructure, including power lines, substations, and distribution networks.

1. **Which of the following tasks can be performed using computer-based Electrical Power System Analysis software?**

a) Performing load flow studies

b) Repairing electrical equipment

c) Conducting high-voltage insulation tests

d) Installing lightning arrestors

**Answer: a) Performing load flow studies**

**Explanation:** Electrical Power System Analysis software is used to perform load flow studies, analyze system stability, and optimize the operation of power systems.

1. **What is the significance of Finite Element Analysis (FEA) software in electrical technology?**

a) Modeling and optimizing electromagnetic devices

b) Testing electrical conductivity of materials

c) Designing safety protocols for electrical installations

d) Analyzing power quality in electrical grids

**Answer: a) Modeling and optimizing electromagnetic devices**

**Explanation:** Finite Element Analysis (FEA) software is used to model and optimize electromagnetic devices, such as transformers, motors, and generators, by simulating their behavior under various conditions.

### Digital Logic Design (ET 282)

1. **What is the primary function of a decoder in digital logic design?**
   * a) To perform arithmetic operations
   * b) To generate an output based on the input code
   * c) To store data temporarily
   * d) To amplify digital signals

**Answer: b) To generate an output based on the input code**

**Explanation:** Decoders are combinational circuits that convert coded inputs into a specific set of outputs, typically used in address decoding and data routing applications.

1. **Which logic gate produces a high output only when all of its inputs are high?**
   * a) AND gate
   * b) OR gate
   * c) NOT gate
   * d) XOR gate

**Answer: a) AND gate**

**Explanation:** An AND gate produces a high output only when all of its inputs are high; otherwise, the output is low.

1. **What is the Boolean expression for an OR gate with inputs A and B?**
   * a) A \* B
   * b) A + B
   * c) A / B
   * d) A - B

**Answer: b) A + B**

**Explanation:** The Boolean expression for an OR gate with inputs A and B is A + B, indicating that the output is high if either input A or input B (or both) is high.

1. **In digital logic design, what does a flip-flop do?**
   * a) Adds two binary numbers
   * b) Stores a single bit of data
   * c) Generates a clock signal
   * d) Performs multiplication operations

**Answer: b) Stores a single bit of data**

**Explanation:** Flip-flops are fundamental building blocks in digital circuits used for storing binary data, such as memory elements, registers, and sequential logic circuits.

1. **Which logic gate is equivalent to the Boolean expression A \* B?**
   * a) AND gate
   * b) OR gate
   * c) XOR gate
   * d) NAND gate

**Answer: a) AND gate**

**Explanation:** The Boolean expression A \* B represents the AND operation, which is implemented by an AND gate in digital logic design.

1. **What is the purpose of a multiplexer (MUX) in digital circuits?**
   * a) To perform arithmetic operations
   * b) To generate clock signals
   * c) To select one of several input data sources and route it to a single output
   * d) To store data temporarily

**Answer: c) To select one of several input data sources and route it to a single output**

**Explanation:** A multiplexer (MUX) is a digital circuit used to select one of several input data sources and direct it to a single output based on a control signal.

1. **Which logic gate produces a low output only when all of its inputs are high?**
   * a) AND gate
   * b) OR gate
   * c) NOT gate
   * d) XOR gate

**Answer: d) XOR gate**

**Explanation:** An XOR gate produces a low output only when all of its inputs are high; otherwise, the output is high.

1. **What is the Boolean expression for a NAND gate with inputs A and B?**
   * a) A \* B
   * b) A + B
   * c) A / B
   * d) A - B

**Answer: a) A \* B**

**Explanation:** The Boolean expression for a NAND gate with inputs A and B is A \* B, indicating that the output is low only when both inputs A and B are high.

1. **In digital logic design, what does a counter circuit do?**
   * a) Converts analog signals to digital signals
   * b) Generates clock signals
   * c) Counts the number of clock pulses or events
   * d) Stores a single bit of data

**Answer: c) Counts the number of clock pulses or events**

**Explanation:** A counter circuit in digital logic design is used to count the number of clock pulses or other events and produce a corresponding digital output.

1. **What is the primary function of a comparator in digital circuits?**
   * a) To perform addition operations
   * b) To compare two binary numbers and determine their relationship
   * c) To generate a clock signal
   * d) To store data temporarily

**Answer: b) To compare two binary numbers and determine their relationship**

**Explanation:** A comparator in digital circuits compares two binary numbers and determines their relationship, such as equality, greater than, or less than. It produces appropriate output signals based on the comparison result.

**Electronics skill training (EAT-322)**

1. **What is the purpose of a resistor in an electronic circuit?**

a) To amplify signals

b) To store electrical energy

c) To regulate current flow

d) To convert AC to DC

**Answer: c) To regulate current flow**

**Explanation:** Resistors are passive components used to control the flow of electric current in a circuit by providing resistance.

1. **Which component is commonly used to amplify electrical signals?**

a) Capacitor

b) Diode

c) Transistor

d) Inductor

**Answer: c) Transistor**

**Explanation:** Transistors are semiconductor devices used for amplifying or switching electronic signals in electronic circuits.

1. **What does the term 'LED' stand for in electronics?**

a) Light Emitting Diode

b) Linear Electronic Device

c) Light Emitting Detector

d) Low Energy Diode

**Answer: a) Light Emitting Diode**

**Explanation:** LED stands for Light Emitting Diode, which is a semiconductor light source that emits light when an electric current passes through it.

1. **Which type of electronic component stores electrical charge and releases it when needed?**

a) Resistor

b) Capacitor

c) Diode

d) Transformer

**Answer: b) Capacitor**

**Explanation:** Capacitors are passive components used to store and release electrical energy in electronic circuits.

1. **What is the primary function of a diode in an electronic circuit?**

a) To regulate voltage

b) To store data

c) To control current flow in one direction

d) To amplify signals

**Answer: c) To control current flow in one direction**

**Explanation:** Diodes are semiconductor devices that allow current to flow in one direction while blocking it in the opposite direction, commonly used for rectification and switching purposes.

1. **Which electronic component is commonly used to regulate voltage in a circuit?**

a) Resistor

b) Capacitor

c) Inductor

d) Voltage Regulator

**Answer: d) Voltage Regulator**

**Explanation:** Voltage regulators are electronic circuits or devices used to maintain a constant output voltage level regardless of variations in input voltage or load conditions.

1. **What is the primary function of an operational amplifier (op-amp) in electronic circuits?**

a) To generate oscillations

b) To amplify signals

c) To filter noise

d) To rectify AC signals

**Answer: b) To amplify signals**

**Explanation:** Operational amplifiers (op-amps) are versatile electronic devices used for amplifying or processing analog signals in electronic circuits.

1. **Which type of electronic component is commonly used to store and retrieve data in digital systems?**

a) Capacitor

b) Transistor

c) Resistor

d) Memory

**Answer: d) Memory**

**Explanation:** Memory devices are electronic components used to store and retrieve data in digital systems, such as RAM (Random Access Memory) and ROM (Read-Only Memory).

1. **Which electronic component is commonly used to convert AC (Alternating Current) to DC (Direct Current) in a power supply?**

a) Transistor

b) Capacitor

c) Diode

d) Inductor

**Answer: c) Diode**

**Explanation:** Diodes are commonly used in rectifier circuits to convert AC voltage to DC voltage by allowing current to flow in one direction only.

1. **What is the primary purpose of a transformer in an electronic circuit?**

a) To convert mechanical energy into electrical energy

b) To amplify electrical signals

c) To regulate voltage

d) To generate high-frequency oscillations

**Answer: c) To regulate voltage**

**Explanation:** Transformers are electromagnetic devices used to step-up or step-down voltage levels in an electrical circuit, depending on the turns ratio of the windings.

**INSTALLATION AND MENTAINANCE OF ELECTRICAL CONTROL SYSTEM (EAT-332)**

* **What is the primary purpose of electrical control systems in industrial applications?**

a) To generate electrical energy

b) To regulate voltage levels

c) To monitor and control machinery

d) To provide lighting solutions

**Answer: c) To monitor and control machinery**

**Explanation:** Electrical control systems are used in industrial applications to monitor and control the operation of machinery and processes, ensuring efficient and safe operation.

* **Which component is commonly used as a sensor in electrical control systems to detect changes in temperature?**

a) Potentiometer

b) Thermocouple

c) Solenoid

d) Relay

**Answer: b) Thermocouple**

**Explanation:** Thermocouples are temperature sensors commonly used in electrical control systems to measure temperature changes and provide feedback to control devices.

* **What is the purpose of a relay in an electrical control system?**

a) To regulate voltage

b) To convert AC to DC

c) To switch electrical circuits on or off

d) To store electrical energy

**Answer: c) To switch electrical circuits on or off**

**Explanation:** Relays are electromechanical switches used in electrical control systems to control the flow of electricity in a circuit based on the input from other control devices.

* **Which type of electrical control device is commonly used for starting and stopping motors in industrial applications?**

a) Contactor

b) Capacitor

c) Fuse

d) Resistor

**Answer: a) Contactor**

**Explanation:** Contactors are electrical switches specifically designed for controlling electric motors, allowing for remote starting and stopping of motor-driven equipment.

* **What is the primary function of a PLC (Programmable Logic Controller) in an electrical control system?**

a) To regulate voltage levels

b) To convert analog signals to digital signals

c) To control automated processes based on logic programming

d) To measure electrical current

**Answer: c) To control automated processes based on logic programming**

**Explanation:** PLCs are specialized digital computers used in electrical control systems to automate industrial processes by executing logic-based control algorithms.

* **Which type of sensor is commonly used to detect the presence or absence of objects in proximity to the sensor?**

a) Ultrasonic sensor

b) Photoelectric sensor

c) Pressure sensor

d) Hall effect sensor

**Answer: b) Photoelectric sensor**

**Explanation:** Photoelectric sensors use light beams to detect the presence or absence of objects in proximity to the sensor and are commonly used in industrial automation applications.

* **What is the primary purpose of a VFD (Variable Frequency Drive) in an electrical control system?**

a) To regulate voltage levels

b) To convert DC to AC

c) To control the speed of AC motors

d) To measure electrical resistance

**Answer: c) To control the speed of AC motors**

**Explanation:** VFDs are electronic devices used to control the speed of AC motors by varying the frequency and voltage of the electrical power supplied to the motor.

* **Which electrical control device is commonly used to protect electrical circuits from overcurrent conditions?**

a) Contactor

b) Circuit breaker

c) Fuse

d) Relay

**Answer: b) Circuit breaker**

**Explanation:** Circuit breakers are protective devices designed to automatically interrupt electrical circuits in the event of overcurrent conditions to prevent damage to equipment and wiring.

* **What is the primary function of a PID controller in an electrical control system?**

a) To regulate voltage levels

b) To provide short-circuit protection

c) To control process variables such as temperature, pressure, and flow

d) To measure electrical power consumption

**Answer: c) To control process variables such as temperature, pressure, and flow**

**Explanation:** PID controllers are feedback control devices used in electrical control systems to regulate process variables such as temperature, pressure, and flow by adjusting the control output based on the difference between the desired setpoint and the measured process variable.

* **Which type of electrical control device is commonly used to regulate the flow of electricity to heating elements in industrial furnaces and ovens?**

a) Contactor

b) Thyristor

c) Relay

d) Transformer

**Answer: b) Thyristor**

**Explanation:** Thyristors, also known as silicon-controlled rectifiers (SCRs), are semiconductor devices commonly used in electrical control systems to regulate the flow of electricity to heating elements in industrial furnaces and ovens.

**INDUSTRIAL REBOT TECHNOLOGY (EAT-342)**

1. **What is the primary function of an industrial robot in manufacturing processes?**

a) Quality control

b) Material handling

c) Inventory management

d) Facility maintenance

**Answer: b) Material handling**

**Explanation:** Industrial robots are commonly used for material handling tasks such as picking, placing, and transferring objects in manufacturing processes to increase efficiency and productivity.

1. **Which type of industrial robot is designed to perform tasks in a fixed position without moving along a predefined path?**

a) Cartesian robot

b) SCARA robot

c) Articulated robot

d) Parallel robot

**Answer: a) Cartesian robot**

**Explanation:** Cartesian robots, also known as gantry robots, operate in a fixed position and move objects along three linear axes (X, Y, Z) to perform tasks such as stacking, palletizing, and machining.

1. **What is the primary advantage of using articulated robots in industrial applications?**

a) High payload capacity

b) Precise positioning and flexibility

c) Low cost of maintenance

d) Minimal floor space requirement

**Answer: b) Precise positioning and flexibility**

**Explanation:** Articulated robots use multiple rotary joints to provide flexibility and precise positioning, making them suitable for a wide range of industrial tasks such as welding, painting, and assembly.

1. **Which sensor technology is commonly used to enable industrial robots to detect and respond to changes in their environment?**

a) Proximity sensors

b) Force-torque sensors

c) Vision sensors

d) Temperature sensors

**Answer: a) Proximity sensors**

**Explanation:** Proximity sensors are used in industrial robots to detect the presence or absence of objects in their proximity and provide feedback for navigation, collision avoidance, and object detection.

1. **What is the purpose of a force-torque sensor in industrial robot applications?**

a) To measure the temperature of the environment

b) To detect changes in humidity levels

c) To sense and measure forces and torques exerted on the robot

d) To monitor electrical power consumption

**Answer: c) To sense and measure forces and torques exerted on the robot**

**Explanation:** Force-torque sensors are used in industrial robots to sense and measure forces and torques exerted on the robot's end-effector or tooling, enabling precise control and interaction with the environment.

1. **Which programming method allows industrial robots to perform tasks by teaching them specific motions and positions?**

a) Offline programming

b) Point-to-point programming

c) Cartesian programming

d) Teach pendant programming

**Answer: d) Teach pendant programming**

**Explanation:** Teach pendant programming involves manually guiding or "teaching" the robot through its desired motions and positions using a handheld device called a teach pendant.

1. **What is the primary advantage of using offline programming for industrial robots?**

a) Reduced programming time and cost

b) Higher precision and accuracy

c) Real-time monitoring and control

d) Increased flexibility in programming complex tasks

**Answer: a) Reduced programming time and cost**

**Explanation:** Offline programming allows programmers to develop and simulate robot programs on a computer without the need for physical access to the robot, resulting in reduced programming time and cost.

1. **Which type of industrial robot is characterized by its cylindrical work envelope and vertical articulation?**

a) Cartesian robot

b) SCARA robot

c) Delta robot

d) Articulated robot

**Answer: c) Delta robot**

**Explanation:** Delta robots feature a cylindrical work envelope and vertical articulation, making them suitable for high-speed pick-and-place operations in industries such as food processing and packaging.

1. **What is the primary function of a gripper in industrial robot applications?**

a) To provide power to the robot's motors

b) To regulate the robot's movement speed

c) To hold and manipulate objects

d) To monitor environmental conditions

**Answer: c) To hold and manipulate objects**

**Explanation:** Grippers are end-of-arm tooling devices attached to industrial robots to grasp, hold, and manipulate objects during manufacturing processes such as assembly, packaging, and material handling.

1. **Which type of industrial robot is commonly used for precise assembly and testing tasks in electronics and automotive industries?**

a) Cartesian robot

b) SCARA robot

c) Articulated robot

d) Parallel robot

**Answer: b) SCARA robot**

**DESIGN OF INTELLENGANCE PRODUCT BASED ON ARDUINO (EAT-351)**

1. **What is Arduino?**

a) A type of microprocessor

b) A single-board microcontroller platform

c) A programming language

d) A type of sensor

**Answer: b) A single-board microcontroller platform**

**Explanation:** Arduino is an open-source electronics platform based on easy-to-use hardware and software. It consists of a single-board microcontroller and a development environment for writing software for the board.

1. **Which of the following is NOT a type of Arduino board?**

a) Uno

b) Nano

c) Raspberry Pi

d) Mega

**Answer: c) Raspberry Pi**

**Explanation:** Raspberry Pi is a separate single-board computer platform, not an Arduino board.

1. **What programming language is primarily used with Arduino?**

a) C++

b) Java

c) Python

d) Assembly language

**Answer: a) C++**

**Explanation:** Arduino programming is done using a simplified version of C++.

1. **What is the purpose of a shield in Arduino projects?**

a) To protect the Arduino board from physical damage

b) To provide additional memory storage

c) To extend the capabilities of the Arduino board

d) To act as a power source for the Arduino board

**Answer: c) To extend the capabilities of the Arduino board**

**Explanation:** Shields are expansion boards that can be plugged into Arduino boards to provide additional functionality such as motor control, GPS, Ethernet connectivity, etc.

1. **Which Arduino board is most commonly used for beginners and prototyping?**

a) Arduino Uno

b) Arduino Mega

c) Arduino Nano

d) Arduino Due

**Answer: a) Arduino Uno**

**Explanation:** Arduino Uno is the most commonly used board for beginners due to its simplicity and versatility.

1. **What is the function of the setup() function in Arduino sketches?**

a) To initialize variables and libraries

b) To define the main loop of the program

c) To control external hardware components

d) To read sensor data

**Answer: a) To initialize variables and libraries**

**Explanation:** The setup() function is called once when the program starts and is used to initialize variables, pin modes, and libraries.

1. **Which Arduino function is used to send data to the computer's serial monitor for debugging purposes?**

a) loop()

b) beginSerial()

c) print()

d) Serial.print()

**Answer: d) Serial.print()**

**Explanation:** Serial.print() function is used to send data to the computer's serial monitor.

1. **What is the purpose of pinMode() function in Arduino?**

a) To define the output state of a digital pin

b) To define the input state of a digital pin

c) To define the analog state of a pin

d) To define the interrupt state of a pin

**Answer: a) To define the output state of a digital pin**

**Explanation:** pinMode() function is used to configure a pin as either an input or an output.

1. **What is the role of digitalWrite() function in Arduino?**

a) To read the analog value of a pin

b) To write a digital value (HIGH or LOW) to a pin

c) To control the speed of a motor

d) To read the state of a switch

**Answer: b) To write a digital value (HIGH or LOW) to a pin**

**Explanation:** digitalWrite() function is used to set the state of a digital pin to either HIGH (5V) or LOW (0V).

1. **Which Arduino function is used to read the analog value from an analog pin?**

a) analogRead()

b) digitalRead()

c) pulseIn()

d) analogWrite()

**Answer: a) analogRead()**

**Explanation:** analogRead() function is used to read the analog value (0 to 1023) from an analog pin.

**Installation and Commissioning of PLC Control Systems (EAT-362)**

1. **What is the primary purpose of a PLC (Programmable Logic Controller) in industrial automation?**

a) To regulate voltage levels

b) To store and execute control logic

c) To measure temperature and pressure

d) To generate electrical signals

**Answer: b) To store and execute control logic**

**Explanation:** PLCs are specialized digital computers used in industrial automation to store and execute control logic for controlling machinery and processes.

1. **Which of the following is a common input device used with PLCs for sensing physical variables such as temperature and pressure?**

a) Proximity sensor

b) Encoder

c) Thermocouple

d) Solenoid valve

**Answer: c) Thermocouple**

**Explanation:** Thermocouples are temperature sensors commonly used with PLCs to sense temperature changes in industrial processes.

1. **What is the purpose of a PLC output module in a control system?**

a) To process and analyze data

b) To provide power to the PLC

c) To convert digital signals to analog signals

d) To control actuators and devices

**Answer: d) To control actuators and devices**

**Explanation:** PLC output modules are used to interface with external devices such as motors, valves, and relays to control industrial processes.

1. **Which programming language is commonly used to program PLCs?**

a) C++

b) Java

c) Ladder logic

d) Python

**Answer: c) Ladder logic**

**Explanation:** Ladder logic is a graphical programming language used to program PLCs, resembling electrical relay logic diagrams.

1. **What is the purpose of commissioning a PLC control system?**

a) To design the control logic

b) To install the hardware components

c) To test and verify the system operation

d) To manufacture the PLC hardware

**Answer: c) To test and verify the system operation**

**Explanation:** Commissioning involves testing and verifying the operation of the PLC control system to ensure that it meets the specified requirements.

1. **Which component is responsible for storing the control program and data in a PLC?**

a) CPU (Central Processing Unit)

b) Memory module

c) Input module

d) Output module

**Answer: b) Memory module**

**Explanation:** Memory modules in PLCs store the control program, data, and system configuration settings.

1. **What is the function of an input module in a PLC control system?**

a) To process control logic

b) To provide power to the PLC

c) To interface with input devices

d) To control actuators and devices

**Answer: c) To interface with input devices**

**Explanation:** Input modules in PLCs interface with input devices such as sensors and switches to receive signals from the external environment.

1. **Which type of PLC programming language allows users to specify control logic using Boolean expressions?**

a) Function block diagram (FBD)

b) Structured text (ST)

c) Sequential function chart (SFC)

d) Instruction list (IL)

**Answer: d) Instruction list (IL)**

**Explanation:** Instruction list (IL) is a low-level PLC programming language that allows users to specify control logic using Boolean expressions and mnemonic codes.

1. **What is the role of a CPU (Central Processing Unit) in a PLC?**

a) To store the control program

b) To interface with input and output devices

c) To execute the control program

d) To provide power to the PLC

**Answer: c) To execute the control program**

**Explanation:** The CPU in a PLC is responsible for executing the control program stored in memory, processing input signals, and generating output signals based on the control logic.

1. **What is the primary advantage of using PLCs in industrial control systems?**

a) High processing speed

b) Low cost

c) Ease of programming and maintenance

d) Compatibility with legacy systems

**Answer: c) Ease of programming and maintenance**

**Explanation:** PLCs offer ease of programming and maintenance compared to traditional relay-based control systems, making them widely used in industrial automation applications.

**FREQUENCY CONVERSION AND SERVO SYSTEM (EAT-372)**

1. **What is the primary function of a frequency converter in electrical systems?**

a) To convert DC voltage to AC voltage

b) To regulate voltage levels

c) To convert AC power at one frequency to AC power at another frequency

d) To store electrical energy

**Answer: c) To convert AC power at one frequency to AC power at another frequency**

**Explanation:** Frequency converters are electronic devices used to change the frequency of alternating current (AC) power while maintaining a constant voltage level.

1. **Which type of motor is commonly used in servo systems for precise control of position, velocity, and acceleration?**

a) Induction motor

b) DC motor

c) Stepper motor

d) Synchronous motor

**Answer: b) DC motor**

**Explanation:** DC motors are commonly used in servo systems due to their ability to provide precise control over speed and position.

1. **What is the primary purpose of closed-loop control in servo systems?**

a) To provide feedback and adjust system performance

b) To regulate voltage levels

c) To convert analog signals to digital signals

d) To store and retrieve data

**Answer: a) To provide feedback and adjust system performance**

**Explanation:** Closed-loop control systems use feedback from sensors to continuously adjust system performance and maintain desired operating conditions.

1. **Which component is responsible for converting digital control signals into analog control signals in servo systems?**

a) Encoder

b) Amplifier

c) Controller

d) Digital-to-analog converter (DAC)

**Answer: d) Digital-to-analog converter (DAC)**

**Explanation:** Digital-to-analog converters (DACs) are used in servo systems to convert digital control signals from the controller into analog signals for driving the motor.

1. **What is the role of an encoder in a servo system?**

a) To provide feedback on motor position and velocity

b) To regulate voltage levels

c) To convert analog signals to digital signals

d) To store and retrieve data

**Answer: a) To provide feedback on motor position and velocity**

**Explanation:** Encoders are feedback devices used in servo systems to provide precise information about the position and velocity of the motor shaft.

1. **Which control method is commonly used in servo systems to minimize tracking error and improve performance?**

a) Proportional control

b) Integral control

c) Derivative control

d) PID control

**Answer: d) PID control**

**Explanation:** PID (Proportional-Integral-Derivative) control is a common control method used in servo systems to adjust the control signal based on the error, integral of the error, and derivative of the error.

1. **What is the purpose of a servo drive in a servo system?**

a) To convert DC voltage to AC voltage

b) To regulate voltage levels

c) To amplify control signals and provide power to the motor

d) To store electrical energy

**Answer: c) To amplify control signals and provide power to the motor**

**Explanation:** Servo drives amplify the control signals from the controller and provide the necessary power to drive the motor.

1. **Which type of feedback control system compares the output signal with a reference signal to generate an error signal?**

a) Open-loop control system

b) Closed-loop control system

c) Feedforward control system

d) Cascade control system

**Answer: b) Closed-loop control system**

**Explanation:** Closed-loop control systems compare the output signal with a reference signal to generate an error signal, which is used to adjust the system's performance.

1. **What is the primary advantage of using servo systems over traditional control systems in industrial applications?**

a) Higher efficiency

b) Lower cost

c) Greater precision and accuracy

d) Simplicity of operation

**Answer: c) Greater precision and accuracy**

**Explanation:** Servo systems offer greater precision and accuracy in controlling position, velocity, and acceleration compared to traditional control systems.

1. **Which parameter determines the speed and torque characteristics of a motor in a servo system?**

a) Voltage

b) Frequency

c) Current

d) Control signal

**Answer: d) Control signal**

**Explanation:** The control signal sent to the motor determines its speed and torque characteristics in a servo system.

**POWER SUPPLY AND DISTRIBUTION TECHNOLOGY (EAT-382)**

1. **What is the primary purpose of a transformer in power distribution systems?**

a) To convert AC to DC

b) To regulate voltage levels

c) To store electrical energy

d) To generate electrical signals

**Answer: b) To regulate voltage levels**

**Explanation:** Transformers are used to step-up or step-down voltage levels in power distribution systems, enabling efficient transmission and distribution of electricity.

1. **Which type of power plant generates electricity by converting mechanical energy into electrical energy using turbines driven by steam or water?**

a) Nuclear power plant

b) Hydroelectric power plant

c) Solar power plant

d) Wind power plant

**Answer: b) Hydroelectric power plant**

**Explanation:** Hydroelectric power plants generate electricity by harnessing the potential energy of water stored in reservoirs and converting it into mechanical energy to drive turbines, which, in turn, generate electrical energy.

1. **What is the function of a substation in a power distribution system?**

a) To generate electrical energy

b) To store electrical energy

c) To step-up or step-down voltage levels

d) To regulate frequency

**Answer: c) To step-up or step-down voltage levels**

**Explanation:** Substations are facilities used to step-up or step-down voltage levels in power distribution systems before electricity is transmitted to end-users.

1. **Which component protects electrical circuits from overcurrent conditions by interrupting the flow of electricity?**

a) Fuse

b) Transformer

c) Capacitor

d) Relay

**Answer: a) Fuse**

**Explanation:** Fuses are protective devices designed to interrupt the flow of electricity in an electrical circuit when the current exceeds a specified value, thereby protecting the circuit from damage.

1. **What is the purpose of a capacitor in power supply systems?**

a) To regulate voltage levels

b) To store electrical energy

c) To convert AC to DC

d) To filter out noise and fluctuations

**Answer: d) To filter out noise and fluctuations**

**Explanation:** Capacitors are used in power supply systems to filter out noise and fluctuations in voltage, ensuring stable and reliable power delivery.

1. **Which type of power distribution system supplies power to multiple loads from a single source through a network of interconnected conductors?**

a) Radial distribution system

b) Ring distribution system

c) Parallel distribution system

d) Series distribution system

**Answer: b) Ring distribution system**

**Explanation:** In a ring distribution system, power is supplied to multiple loads from a single source through a network of interconnected conductors forming a closed loop.

1. **What is the primary function of an uninterruptible power supply (UPS) in power supply systems?**

a) To regulate voltage levels

b) To store electrical energy

c) To provide backup power during outages

d) To convert DC to AC

**Answer: c) To provide backup power during outages**

**Explanation:** UPS systems are used to provide backup power during outages by supplying electricity from batteries or a secondary power source until normal power is restored.

1. **Which parameter determines the capacity of a transmission line to carry electrical power?**

a) Voltage

b) Current

c) Resistance

d) Frequency

**Answer: b) Current**

**Explanation:** The capacity of a transmission line to carry electrical power is determined by the current it can safely carry without exceeding its thermal limits.

1. **What is the primary advantage of three-phase power distribution over single-phase power distribution?**

a) Higher voltage levels

b) Lower cost of equipment

c) Greater power efficiency

d) Simplicity of installation

**Answer: c) Greater power efficiency**

**Explanation:** Three-phase power distribution systems offer greater power efficiency and smoother power delivery compared to single-phase systems, especially for industrial and commercial applications.

1. **Which device is used to measure electrical energy consumption in residential and commercial buildings?**

a) Voltmeter

b) Ammeter

c) Kilowatt-hour meter

d) Power factor meter

**Answer: c) Kilowatt-hour meter**

**Explanation:** Kilowatt-hour meters, also known as energy meters or electricity meters, are used to measure the amount of electrical energy consumed over time in kilowatt-hours (kWh).