1.Define – "ROBOT"
A robot is an autonomous machine capable of sensing its environment, carrying out computations to make decisions, and performing actions in the real world.

2.What makes something a Robot?
1. **Sense**: Robots use sensors to gather data about their environment (e.g., cameras, microphones, or infrared sensors).
2. **Compute**: They process this data using algorithms and decision-making systems to understand their surroundings and determine actions.
3. **Act**: Robots execute actions based on their computations, such as moving, manipulating objects, or responding to external input or signal.

3.How do Robots function?
A robot works by sensing its surroundings, thinking about what to do based on what it senses, and then moving or acting to do what it needs to do. It's like a smart machine that can see, think, and move to help with tasks!

4.List the types of Robots?
o **Industrial Robots**: Used in factories for tasks like welding and assembly.
o **Service Robots**: Assist with tasks like cleaning or delivering items.
o **Medical Robots**: Help with surgeries or patient care.
o **Exploration Robots**: Explore places like space or underwater.
o **Educational Robots**: Teach programming and robotics concepts.
o **Entertainment Robots**: Provide interactive play or performance experiences.

5.What is "Aerospace Robots" give few examples and their applications.
Aerospace robots is a diverse category that includes robots that fly and robots for space applications.
- **Example**: Robotic Seagull, Raven fixed-wing drone, Curiosity, Mars rovers, Ingenuity Mars helicopter.
- **Application**: They are used to get a bird's-eye view and capture images of a particular location.

6.What is "Aquatic Robots" give few examples and their applications.
o Robot that live in water don't mind getting wet.
o **Examples: *Saildrone, Wave Glider, Quanaut***
o **Applications:** They are employed for surveillance missions, infrastructure inspection and repair, and the collection of environmental data about the world's waters.

7.What is "Delivery Robots" give few examples and their applications.
o Delivery robots transport items like food, groceries and medical supplies from one point to another.
o Examples: ***Starship, Sidewalks, Relay, Zipline***
o Applications: They use cameras, GPS and other sensors to travel autonomously, carrying their cargo in secure compartments.

8. What is "Disaster Response" give few examples and their applications.
Disaster response robots perform dangerous jobs like searching for survivors in the aftermath of an emergency. These robots are rugged and can withstand high temperatures, moisture, dirt and debris and some are even radiation-proof.
  o   Example: PackBot, Kobra, Quince.
  o   Applications: in 2011, after an Earthquake and tsunami struct japan, first responders deployed robots to inspect hazards areas.

9. What is "Drones" give few examples and their applications.
Drones are flying robots that let you capture data and images from an elevated vantage point. Drone come in a variety of sizes and shapes. A common design, which uses four rotors to fly, is called a quadrotor or quadcopter.
  o   Examples: DJI's Phantom, Anafi, Skydio, Global hawk
  o   Applications: long duration surveillance, track and film from different angles

10. What is "Educational Robots" give few examples and their applications.
Robots include a variety of hands-on robotics modules and kits. You can find them in classrooms, STEM programs and homes.
  o   Examples: Popular models, include programmable robots like **Cubelets, Dash and Dot, Root**.
  o   Applications: These robots use movement, lights, and sound to help students learn problem-solving and coding skills.

11. What is "Exoskeletons" give few examples and their applications.
Exoskeletons are wearable robotic suits equipped with electric motors that help move the user's body. Some powered exoskeletons can even give the user superhuman strength.
  o   Examples: **Ekso, HAL robot suits, Guardian XO**.
  o   Applications: They work using sensors that detect when the user wants to move – to get up or work.

12. What is "Humanoid Robots" give few examples.
Humanoid robots have a mechanical body with arms, legs and a head like that of a person's and they can often walk and manipulate objects much like we do.
  o   **Examples**: Asimo from Honda, Athletic, agile atlas from Boston Dynamics**, Dash and Dot, Root**.
  o   **Applications**: Humanoids can also have a human-like appearance. Example include the Geminoid family of robots, which resemble real people. Humanoid, more than any other category of robots, have captured people's imaginations.

13. What is a Sensor?
A sensor is a device that detects and measures physical properties, such as light, temperature, or motion, and converts this information into signals that a robot or system can understand and use.

14. What is an Actuator?

An actuator is a component that converts electrical signals into physical movement or action. It's responsible for moving parts of a robot, such as motors that drive wheels or arms, based on commands from the robot's control system.

15.What is Arduino-IDE?

Arduino-IDE is a software (Open Source) tool used to write, compile, and upload code to Arduino microcontrollers.

16.Write the application of Arduino-IDE?

Arduino-IDE is used to develop and upload code for projects like controlling robots, building smart home devices, and creating interactive art.

17.Explain Setup() and Loop() function in Arduino-IDE?

In Arduino programming:

- **setup():** Runs once when the Arduino starts. It's used to initialize settings, like setting pin modes or starting serial communication.

- **loop():** Runs repeatedly after setup(). It contains the main code that keeps running, allowing the Arduino to perform tasks continuously or repeatedly.

18.What is a Arduino Sketch()?

An Arduino sketch is a **Program / Code** written for Arduino boards using the Arduino-IDE.

19.What is Open and Closed electrical circuits?

o **Open Circuit**: A circuit with a break or gap that prevents electrical current from flowing through it. Devices in an open circuit do not operate because the circuit is incomplete.

o **Closed Circuit**: A complete circuit path with no breaks, allowing electrical current to flow continuously. Devices in a closed circuit operate as intended because the circuit is complete.
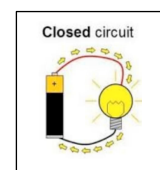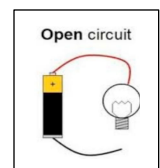
Electrical Tools

Working with electricity can be dangerous, if not done with proper tools. These tools are essential to safely build electronic devices. Let's take a look at a few of them.
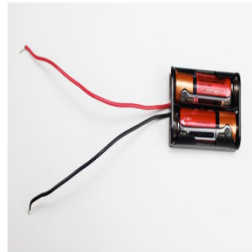
1. Breadboard- This is an essential tool for prototyping and building temporary circuits. These boards contain holes for inserting wire and components.
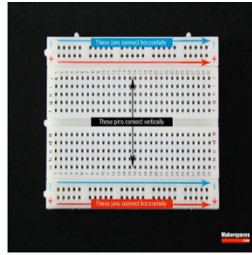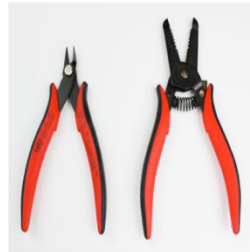
2. Digital Multimeter- This is a device that measures electric current (amps), voltage (volts), and resistance (ohms).

**3. Battery Holders-** A battery holder is a plastic case that holds batteries from 9V to AA.

4. Wire Cutter- Wire cutters are essential for stripping stranded and solid copper wire.

5. Light-Emitting Diode (LED)- A light-emitting diode is like a standard diode because electrical current only flows in one direction.

6. Resistor- Resistors are used to resist the flow of current or control the voltage in a circuit.
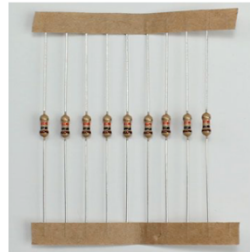
7. Heat Gun- A heat gun is used to shrink plastic tubing, known as heat shrink, to help protect the exposed wire.

8. Soldering Iron- When it is time to create a permanent circuit, this tool will solder the parts together.

20. What is Arduino UNO Rev 3?

The *Arduino Uno Rev 3* is a *popular microcontroller board* based on the ATmega328P chip. It features *14 digital input/output pins*, *6 analog inputs*, a *USB connection for programming*, and *a power jack*. It's widely used for prototyping and learning in electronics due to its simplicity and extensive community support

21. Explain DHT11 Sensor and its application.

The DHT11 sensor measures temperature and humidity. It sends this data to a microcontroller, like an Arduino, so one can use this info in the project. It is simple and affordable way to monitor environmental conditions (weather).

22. What are Jumper Wires and its applications?

Jumper wires are flexible, insulated wires used to connect different parts of a circuit on a breadboard or between components. They make it easy to build and modify electronic circuits without soldering.

Applications: Connecting components on a breadboard to build and test circuits