Top 25 Most Asked IoT Viva Questions (With Deep Explanations)

1. What is Arduino and why is it widely used in IoT?

Arduino is an open-source electronics prototyping platform based on easy-to-use hardware and software. It is built on microcontrollers like ATmega328P. Reasons for its popularity in IoT include: - Simple programming using Arduino IDE with C/C++-like syntax. - Wide variety of ready-to-use libraries for sensors, motors, communication modules. - GPIO pins support analog and digital interfacing. - Huge global community support. - Ideal for rapid prototyping of automation and IoT projects.

2. Explain the steps to install Arduino IDE.

1. Download IDE from Arduino official website.
2. Install it; drivers like CH340 may be needed.
3. Connect Arduino board via USB.
4. Open IDE → Select **Board Type**.
5. Select **COM Port**.
6. Write and Upload a program.

3. Write the logic behind blinking an LED using Arduino.

The LED is connected to a digital PIN. Program logic: - Set pin as OUTPUT. - Turn pin HIGH → LED ON. - Delay. - Turn pin LOW → LED OFF. - Delay. - Loop repeats infinitely.

4. What is the purpose of the `pinMode()` function?

`pinMode(pin, mode)` configures whether a pin behaves as: - INPUT - INPUT_PULLUP - OUTPUT

It prevents undefined behavior and ensures correct electrical operation.

5. Why do we need delay in LED blink program?

Without delay, the LED switches too fast for the human eye to detect. Delay provides visible ON/OFF duration and controls the blinking speed.

6. What is a buzzer and how is it interfaced with Arduino?

A buzzer converts electrical energy into sound. It is connected to a digital pin. When the pin is HIGH, buzzer produces sound.

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7. Explain active vs passive buzzer.

- **Active buzzer**: Has built-in oscillator, produces fixed beep when powered.
- **Passive buzzer**: No oscillator; requires PWM signal to produce different tones.

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8. What is PWM?

Pulse Width Modulation simulates analog output by rapidly switching digital signal between HIGH and LOW. Average voltage depends on duty cycle. Used for LED dimming, motor speed control, sound generation.

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9. How does PWM control RGB LED brightness?

RGB LED has 3 internal LEDs (Red, Green, Blue). Each controlled via PWM. Adjusting duty cycle changes brightness, making millions of color combinations.

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10. What are PWM-supported pins in Arduino Uno?

Pins **3, 5, 6, 9, 10, 11** support PWM using `analogWrite()`.

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11. What is a servo motor?

A servo motor is a closed-loop motor that provides precise angular positioning. Controlled using 50Hz PWM signal. Common rotation range is 0°–180°.

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12. How to control servo using Arduino?

- Include Servo library.
- Attach servo to PWM pin.
- Use `servo.write(angle);` to move shaft. Servo receives continuous correction signals for accuracy.

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13. Why use push button with servo?

Push button provides user input. When pressed, Arduino detects HIGH signal and rotates servo by certain degrees (e.g., 15°). Used in access control, lockers, robotics.

14. What is a stepper motor?

Stepper motor rotates in discrete steps. Each electrical pulse results in fixed angular movement (1.8° typically). Used where precise positioning is required.

15. Which driver modules are used for stepper motors?

- ULN2003 → 28BYJ-48
- A4988 → NEMA 17
- L298N → General motors including steppers

They protect Arduino from high current.

16. How to rotate stepper motor clockwise/anticlockwise?

Changing the sequence of coil energizing: - Forward sequence → clockwise - Reverse sequence → anticlockwise

Stepper libraries automate these sequences.

17. What is an actuator? Give examples.

Actuator converts electrical energy into mechanical action. Examples: Servo, DC motor, relay, solenoid, buzzer.

18. How to control Arduino using Bluetooth?

Using HC-05 module: - Pair Bluetooth with phone. - Send characters via mobile app. - Arduino reads commands through Serial (RX/TX). - Performs actions like LED on/off, motor control.

19. What is the role of Wi-Fi module in IoT?

Provides internet connectivity for IoT devices. Enables uploading data to cloud, controlling devices remotely, enabling automation. ESP8266 and ESP32 are common.

20. Explain working of ESP8266 module.

ESP8266 has: - Built-in Wi-Fi - TCP/IP stack - GPIO pins - AT command support It can work as a standalone microcontroller or as Wi-Fi adapter for Arduino.

21. Common sensors used with Arduino.

- Temperature: LM35, DHT11
- Humidity: DHT11/DHT22
- Gas: MQ series
- Motion: PIR
- Light: LDR
- Distance: Ultrasonic HC-SR04
- Pressure, Vibration, Pulse sensors

22. What is an analog sensor?

Analog sensor outputs continuously varying voltage proportional to measured physical quantity. Arduino reads values (0–1023). Example: LM35 temperature sensor.

23. What is a digital sensor?

Digital sensor outputs only HIGH or LOW. It does not require analog conversion. Example: PIR sensor.

24. Difference between AnalogRead and DigitalRead.

- **analogRead(pin)** → returns 0–1023 using 10-bit ADC.
- **digitalRead(pin)** → returns only HIGH/LOW.

25. What is LDR and how does it work?

LDR (Light Dependent Resistor) changes resistance based on brightness: - High light → low resistance → high voltage at Arduino pin. - Low light → high resistance → low voltage. Used in automatic lights, night lamps, street lights, alarm systems.