IoT Quiz 1 Question Paper

Instructions:

- Answer all the questions.
- Multiple Options may be correct(Partial Marks will be given)
- Each question(except last) carries equal marks. (0.5 each)
- Last Question is of 2 marks.
- No use of electronic devices is allowed.

Questions

Q1. Tick all those which fall under direct sensors.

- (A) Flow Meter
- (B) Photoresistor (LDR)
- (C) Thermocouple
- (D) Humidity Sensor
- (E) Pressure Sensor

Q2. Tick all those which are classified as Active Sensors.

- (A) Infrared
- (B) Thermocouple
- (C) Piezoelectric
- (D) GPS
- (E) Photodiode

Q3. Which of the following are TRUE?

- (A) Random Errors in sensor data is due to loading factors like temperature changes.
- (B) Repetitive testing of a sensor gives similar values, hence it has high accuracy.
- (C) Resolution of a sensor is the minimal change required to produce a change in signal.
- (D) Dead bands are ranges when the sensor does not give an output.

Q4. Which of the following is FALSE about the torch pins on the ESP32 board?

- (A) They can detect touch based on changes in resistance caused by physical contact.
- (B) You can use them to create touch-based user interfaces without additional hardware.
- (C) Capacitive touch pins require an external resistor to function.
- (D) They can be used to wake-up the ESP32 from deep sleep.
- (E) They are sensitive enough to detect proximity without direct contact in some cases.

Q5. You are using an ultrasonic sensor (HC-SR04) in a project to measure the distance to an object. Which of the following factors could lead to inaccurate readings?

- (A) Reflective surfaces, like mirrors, directly in front of the sensor
- (B) Ambient noise or other ultrasonic signals in the environment
- (C) Ambient temperature and humidity
- (D) Low battery voltage can affect the sensor's performance

6. What happens if you increase the distance between the ultrasonic sensor (e.g., HC-SR04) and the object beyond the sensor's maximum range (typically 4 meters)?

- (A) The sensor will output the maximum measurable distance (e.g., 400 cm).
- (B) The sensor will return a distance value of 0.
- (C) The sensor will continuously send ping signals but will not receive an echo, resulting in no reading.
- (D) The sensor will stop functioning until the object is brought back within range.

7. While calibrating an LDR sensor connected to an ESP32, you notice that the sensor readings vary based on the ambient lighting conditions. Which of the following steps is essential for accurate calibration?

- (A) Measure the LDR sensor readings in both maximum and minimum light conditions to determine the operating range.
- (B) Use a known light intensity source (e.g., a flashlight) to map sensor readings to specific lux values.
- (C) Adjust the resistor value in the voltage divider circuit to fine-tune sensitivity.
- (D) Record multiple readings under different light conditions to account for variability and set appropriate thresholds.
- (E) None of the above.

Q8. When using a pull-up resistor with an ESP32 to control a blinking LED, which of the following correctly describes its behavior?

- (A) The pull-up resistor connects the GPIO pin to GND, ensuring the input reads LOW when the circuit is open.
- (B) The pull-up resistor connects the GPIO pin to the power supply (Vcc), ensuring

the input reads HIGH when the circuit is open.

- (C) The pull-up resistor directly drives the LED to blink without requiring a GPIO pin.
- (D) The pull-up resistor is only used to limit the current flowing through the LED.

Q9. The ESP32's Analog-to-Digital Converter can measure voltages ranging between 0 to 3.3V. However, the sensor produces an analog signal in the range of 0 to 5V, what can you do to ensure accurate measurements from the sensor?

- (A) Use software calibration technique to adjust for the 5V range.
- (B) Increase the power supply voltage to the sensor so it outputs a signal within the 3.3V range.
- (C) Use a voltage divider circuit to scale down the sensor's 5V signal to the ADC's 3.3V range.
- (D) Connect the sensor directly to the ADC, as the ESP32 can automatically handle the 5V signal.

10. Why is a pull-up resistor required when connecting a switch to an input pin of the ESP32, particularly when the pin is configured to read a digital signal?

Mark all the INCORRECT reasons

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- (A) To ensure that the input pin reads a HIGH voltage when the switch is open,
- (B) To limit the power consumption when the switch is pressed, ensuring the ES
- (C) To prevent voltage spikes that might occur when the switch is open, protec
- (D) To allow the input pin to register a HIGH voltage only when the switch is
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11. Why is a pull-down resistor necessary when using a switch or button with an input pin on the ESP32, especially when the pin is configured as a digital input?

- (A) To ensure the input pin reads a LOW voltage when the button is not pressed, preventing floating and undefined states
- (B) To ensure the input pin is powered by the resistor when the button is pressed, providing stable operation
- (C) To filter out any noise or spikes from the switch, providing a clean HIGH signal when pressed
- (D) To prevent the ESP32 from drawing too much current when the switch is open, saving power

12. Your team of engineers are given the task of improving the quality of service in a village (population 10,000), geographically located 400kms from the nearest city. It has decent mobile phone coverage. The quality of service is defined as: the optimal use of electricity, water, sewage, waste, agriculture and the functioning of supporting units like schools, playgrounds, food storage etc. As a team member, you are asked to list and rationalize the sensors to be

used. So, for each of the above services, list the type of sensors for each service (for example: water distribution, quality). (Marks: 2)

End of Paper