



24900145

Name:.....

- a) Differential drive wheels b) Ackermann steering wheels
c) Mecanum or omni-wheels d) Skid-steer wheels
- 4 What type of signal does the analogWrite() function output? [K] [1]
a) Pulse Code Modulated Signal b) Frequency Modulated Signal
c) Pulse Width Modulated Signal d) Pulse Amplitude Modulated Signal
- 5 The basic principle behind the operation of an ultrasonic sensor is [U] [2]
a) Infrared reflection b) Radio wave transmission
c) Sound wave reflection d) Light diffraction
- 6 In a RADAR system utilizing an ultrasonic sensor, what does the term "echo" refer to? [K] [3]
a) The initial sound wave emitted by the sensor b) The reflection of sound waves off an object
c) The failure of the sensor to detect an object d) The signal sent to the servo motor
- 7 Which Function is called repeatedly in an Arduino program? [U] [1]
a) void setup() b) void loop()
c) main() d) init()
- 8 The principle of operation of MQ 2 smoke sensor is the change of _____ in the presence of gas [U] [2]
a) voltage b) resistance
c) current d) capacitance
- 9 Which model is commonly used to represent self-balancing robots? [U] [3]
a) Simple Pendulum Model b) Inverted Pendulum Model
c) Circular Motion Model d) Rotational Model
- 10 Identify the communication protocol used by the MPU6050 to communicate with microcontrollers. [K] [3]
a) UART b) SPI
c) I2C d) CAN

(10 × 1 = 10)

Part B

Short Answer Questions

Answer 4 questions. Each question carries 5 marks

- | | | | |
|----|---|-----|-----|
| 11 | Explain how you would Troubleshoot an Arduino program that is not executing the void loop () function as expected. What steps would you take to identify and fix the issue. | [A] | [1] |
| 12 | Why servo motor is more suitable for robotic arm rather than DC motor? | [U] | [2] |
| 13 | Explain the significance of PWM signals in robotic application | [U] | [1] |
| 14 | How can an autonomous robotic vehicle navigate and change direction in response to obstacles? | [U] | [3] |
| 15 | What is the purpose of an H bridge circuit ? | [U] | [2] |
| 16 | Explain how obstacle detection with IR sensors can be implemented in a real-world robotic application, such as an autonomous vehicle. | [U] | [3] |

(4 × 5 = 20)

Part C

Essay Questions

Answer 2 questions. Each question carries 10 marks

- | | | | |
|----|--|-----|-----|
| 17 | Explain how to use the delay() function in Arduino to create between LED state changes. Include an example program and explain how the delay value affects the LED's behavior? | [U] | [1] |
| 18 | Write a program to read the values from LDR with proper steps? | [A] | [2] |
| 19 | Discuss the working principles of the MPU6050 sensor. Explain how it measures acceleration and angular velocity | [U] | [3] |
| 20 | Develop a program for robot car which stop the movement when an obstacle is detected by the IR sensor | [U] | [2] |

(2 × 10 = 20)

END OF THE QUESTION PAPER
