QP CODE: 24900145



Reg No:....

Name:....

MAHATMA GANDHI UNIVERSITY, KOTTAYAM

FIRST SEMESTER MGU-UGP (HONOURS) REGULAR EXAMINATION NOVEMBER 2024

First Semester

Discipline Specific Core Course - MG1DSCIAM100 - INTERACTIVE ROBOTIC SYSTEMS

(2024 ADMISSION ONWARDS)

Duration: 1.5 Hours

Maximum Marks: 50

Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Interest (I), Appreciation (Ap), and Skill (S)

Students should attempt atleast one question from each course outcome to enhance their overall outcome attainability.

[Learning Domain][CO No(s)]

Part A **Multiple Choice Questions** Answer all questions. Each question carries 1 mark 1 What is the microcontroller used in the Arduino Board [K] [1] ATmega328p b) ATmega2560 a) ATmega32U4 d) ATmega8 c) 2 Material used for making of LDR is_____ [K] [2] Cadmium sulphide b) Silicon a) c) Silver d) Copper

3 Which type of wheel mechanism allows a robot to move in any direction [K] [3] without the need to change its orientation?

	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?					[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					[2]
	a)	Infrared reflection	b)	Radio wave transmission		
	c)	Sound wave reflection	d)	Light diffraction		
6	In a refe	RADAR system utilizing an ultrase r to?	onic	sensor, what does the term "echo"	[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 A			an A	rduino program?	[U]	[1]
	a)	void setup()	b)	void loop()		
	c)	main()	d)	init()		
8	The	principle of operation of MQ 2 sm in the presence of gas	oke s	ensor is the change of	[U]	[2]
	a)	voltage	b)	resistance		
	c)	current	d)	capacitance		
9	Which model is commonly used to represent self-balancing robots?					[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.					[3]
	a)	UART	b)	SPI		

 $(10 \times 1 = 10)$

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 pourpose 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]

 $(4 \times 5 = 20)$

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]

 $(2 \times 10 = 20)$

END OF THE QUESTION PAPER
