PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023

Semester : Semester V - 2021
Course Code : CSE3076
Course Name : Sem V - CSE3076 - Artificial Intelligence for Robotics
Program : B.Tech. Computer Science and Engineering

Date : 30-OCT-2023
Time : 2:00PM - 3:30 PM
Max Marks : 50
Weightage : 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   **(5 X 2 = 10M)**

1. What is a robot?

(CO1) [Knowledge]

2. What are the four R's of Robotics?

(CO1) [Knowledge]

3. List the different types of robots.

(CO1) [Knowledge]

4. Explain Motors or effectors.

(CO2) [Knowledge]

5. Mention some the hardware needs of a robot

(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS   **(2 X 10 = 20M)**

6. a) Illustrates a closed-loop control system for maintaining a constant temperature in a pot of water. And describe how the components in this system, such as the Valve, Temperature Sensor, and Controller, collaborate to maintain the desired temperature? What are the advantages of using a closed-loop control system in this scenario?

b) How does the control loop described, with a timer as the control mechanism and a 4-second set point for a robot moving 3 inches per second, help ensure precise control over the robot's movement? Could you explain the role of the error signal in this process and how it influences the control decisions, especially when the robot needs to stop?

(CO1) [Comprehension]

7. You are a robotics enthusiast who has decided to participate in an Unmanned Ground Robotics Competition. In this competition, the task is to design a robot capable of navigating through a series of challenging obstacles and completing specific objectives. You want to ensure your robot is well-prepared and competitive. What are the steps involved in designing your robot for this Unmanned Ground Robotics Competition?

(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION   (1 X 20 = 20M)

8. a) Imagine you are a robotics programmer working on a project to design a robot capable of picking up a toy and dropping it into a toy box. To help illustrate the robot's behaviour, can you draw a state machine diagram that outlines the steps involved in this process, including the various states and transitions the robot goes through to complete the task?

   b) What are the four different approaches to designing intelligent systems, and how do they differ in terms of whether they prioritize modelling human behaviour or maximizing performance?

(CO1,CO2) [Application]