

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

SET B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester V - 2021

Course Code : MEC3099

Course Name :Autonomous Mobile Robots

Program : B.Tech.

Date : 08-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

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 2M = 10M

1. What are the three functions of vision system?
(CO1) [Knowledge]
2. What are the applications of RADAR based sensors.
(CO2) [Knowledge]
3. Define Direct and Inverse kinematics.
(CO3) [Knowledge]
4. Write a short note on Legged robots.
(CO4) [Knowledge]
5. Write a short note on wheel geometry.
(CO5) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

6. With suitable examples explain Holonomic and Non-holonomic drives.
(CO1) [Comprehension]
7. Explain In-situ performance of robots.
(CO2) [Comprehension]
8. Define perception and with suitable diagram explain the process of perception.
(CO3) [Comprehension]

9. Define configuration space and explain the notations in terms of world frame and robot frame.
(CO4) [Comprehension]
10. With suitable diagram explain Belief representation of robots ?
(CO5) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 20M = 40M

11. The configuration space is a transformation from the physical space in which the robot is of finite-size into another space in which the robot is treated as a point. In other words, the configuration space is obtained by shrinking the robot to a point, while growing the obstacles by the size of the robot. With suitable example explain configuration space of a robot movement in 2D and 3D plane.
(CO3) [Application]
12. The Doppler effect or Doppler shift is the apparent change in frequency of a wave in relation to an observer moving relative to the wave source. Suggest any one type of sensor that works on the principle of Doppler effect and explain with suitable diagram.
(CO5) [Application]