Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Winter 2022 - 23 Examination

Semester: 7 **Date: 03/10/2022**
Subject Code: 203122401 **Time: 10:30 am to 01:00 pm**
Subject Name: Field and Service Robots **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 **Objective Type Questions** - (Each of one mark) **(15)**

1. The speed at which robot is capable of manipulating its end effector is known as the ____. (a) Speed of Movement (b) Precision (c) Velocity of reach (d) Accuracy
2. The capacity of robot to carry load is known as_____. (a) Load carrying capacity (b) maximum reach (c) Work envelope (d) Resilience
3. ____ sensors are used to indicate presence or absence of hot objects
4. The fundamental issue that differentiates various map-based localization systems is the issue of _____.
5. _____induces a limitation on the consistency of sensor readings in the same environmental state.
6. Robot's _____ play an integral role in all the forms of localization.
7. With reference to robot movement, uncertainty _____to the movement grows much faster than that in the direction of movement.
8. In case of Multiple Hypothesis belief, the robot tracks _____ set of positions.
9. With reference to localization, SLAM stands for _____
10. In terms of Robot localization, MCL stands for _____.
11. From a geometric point of view of the robot, one can classify the errors into ___ types (a) 1 (b) 2 (c) 3 (d) 4
12. _____ is area of engineering and science which understand the different principles, structure and programming of robot. (a) Robotics (b) Mechatronics (c) Aeronautics (d) Mechanical
13. Field Robots are machines that work in unstructured environments, including under water, in mines, in forests and on farms, and in the air. True or False
14. Cleaning robot for public places, delivery robot in offices or hospitals, fire-fighting robot are all examples of Service robots. True or False
15. SCARA stands for _____

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) What is Sensor Aliasing? What are the problems faced due to the aliasing phenomenon?
B) Even with noise-free sensors, the amount of information is generally insufficient to identify the robot's position from a single-percept reading" Justify.
C) What is localization? Explain the challenges in localization.
D) Explain the Monte Carlo localization technique with a suitable example

Q.3 A) Discuss various applications of Humanoid Robots. Also explain the method of using facial expression in Humanoid robots **(07)**

B) Explain the various types of belief Representations along with its characteristics **(08)**

OR

B) Discuss the Markov Localization with a suitable example **(08)**

Q.4 A) Explain 4wheel Maccanum Wheel drive with neat sketch What are the advantages of this drive? **(07)**

OR

A) Write the classification of robots based on Locomotion. **(07)**

B) Discuss various applications of Field Robots **(08)**