Nirma University
School of Technology, Institute of Technology
B. Tech (Instrumentation and Control Engineering)

Semester VII

L	T	P	C
2	0	2	3

Course Code	**2ICDE62**
Course Title	**Robotic Control System**

Course Outcomes (CO):

At the end of the course, students will be able to -

1. illustrate properties of robotic hardware useful in autonomous robots.
2. relate the implementation of robots in real world complex applications.
3. formulate solution algorithm related to localization, obstacle avoidance and mapping.
4. develop control algorithm for decision making in intelligent robotic system

Syllabus	**Teaching Hours**
UNIT 1: Introduction Fundamental of robots, components of a complete robot, case studies for wheeled locomotion, legged locomotion and aerial locomotion.	**03**
UNIT 2: Sensor technology Overview of sensor classification, sensor interface for obstacle avoidance, sensors for area scanner, LIDAR on an autonomous robot, feature extraction using range sensor data, inertial measuring unit, sensor for localization and tracking, GPS sensor for path planning, application of encoder in robotics.	**09**
UNIT 3: Robot autonomous navigation Introduction to fuzzy logic control for navigation, simultaneous localization and mapping, obstacle avoidance techniques, navigation architecture, programming related to navigation algorithms, case study of navigation with path planning.	**08**
UNIT 4: Robot vision control Vision for robot control, position based and image based visual servoing, depth measurement with vision system, face and object recognizer application in robotics, case studies of visual servoing in robotics.	**07**
UNIT 5: Intelligent robotic system	**03**

Introduction to artificial intelligence in robotics, reasoning about robot space, case study for intelligent robotics.

Self-Study:
The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:
Laboratory Work will consist of minimum 10 experiments based on the above syllabus.

References:

1. Roland siegwart, Introduction to autonomous mobile robot, PHI Learning Pvt Ltd.
2. Gregory dudek, Computational principle of mobile robotics, Cambridge University press.
3. Diwakar Vaish, Python robotics projects: build smart and collaborative robots using python, Packt Publishing.
4. Robin R. Murphy, Introduction to AI robotics, PHI Learning Pvt Ltd.

L= Lecture, T= Tutorial, P= Practical, C = Credit