The LNMIIT, Jaipur
Department of Mechanical & Mechatronics Engineering

LNMIIT
The LNM Institute of Information Technology

Programme: B. Tech. (MME)	Course Title: Mobile Robotics			Course Code: MME-XXX
Type of Course: Program elective	Prerequisites: Modern Electrical & Electronic Technology (MEET)			Total Contact Hours: 40
Year/Semester: 4/Even	Lecture Hrs/Week: 3	Tutorial Hrs/Week: 0	Practical Hrs/Week: 0	Credits: 3

Learning Objective:

This is a professional elective course offered to 4th year engineering students. It covers the study of kinematics and dynamics of mobile robots. This course presents an introduction to the fundamentals of mobile robotics, spanning the mechanical, motor, sensory, perceptual and cognitive layers that comprise this field of study. This course aims to help students improve their probabilistic modeling skills.

Course outcomes (COs):

On completion of this course, the students will have the ability to:		Bloom's Level
CO1	**Explain** the basics of Mobile Robots.	2
CO2	**Model** kinematics of Mobile Robots.	3
CO3	**Apply** concepts of Mobile Robots in Research and Application area.	3
CO4	**Develop** programs to perform different tasks.	3, 6

Course Topics:

S. No.	Contents	Hours
1	**Introduction to Mobile Robotics**. Mobile Robot features. State of Mobile Robotics research and adoption.	4
2	**Locomotion:** Key issues for locomotion, Legged Mobile Robots, Wheeled Mobile Robots. Examining the basic principles of locomotion. Types of robotics wheels used in mobile robotics application, Study of legged mobile robots.	5
3	**Sensors:** Use of various sensors in mobile robotic application, Sensor classification, Characterizing sensor performance, Wheel/motor sensors, Heading sensors, Ground-based beacons, Active ranging, Motion/speed sensors, Vision-based sensors	6
4	**Mobile Robot Kinematics:** Kinematic Models and Constraints, Mobile Robot Maneuverability, Mobile Robot Workspace, Motion Control (Kinematic Control) Open loop control, Feedback control	10
5	**Mobile Robot Perception, Vision and Navigation:** Introduction to robot perception, Feature extraction, Image acquisition, representation and processing. Introduction to localization, obstacle avoidance and navigation. Environmental perception by mobile robots using AI Techniques. Representing uncertainty for mobile robot, Mobile robot localization. The challenge of localization.	12
6	**Application of Mobile Robots:** Application of mobile robot in various sectors, Planning and navigation of mobile robot subjected to various environmental	3

	condition.	

Textbook References:
Text Book:

1. Roland Siegwart, Illah Reza Nourbakhsh, Davide Scaramuzza, Ronald C. Arkin, *Introduction to Autonomous Mobile Robots*, MIT Press.
2. Gregory Dudek and Michael Jenkin, *Computational Principles of Mobile Robotics*, Cambridge University Press.

Reference books:

1. Kevin M. Lynch, Frank C. Park, *Modern Robotics*, Cambridge University Press
2. Y. Korem, *Robotics for engineers*, Mc Graw-Hill.

Additional Resources:

NPTEL, MIT Video Lectures, Web Resources etc.

Evaluation Method	
Item	**Weightage (%)**
Midterm	30
Endterm	50
Assignment/ Presentation/ Project/ Quiz	20

CO and PO Correlation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	-	-	1	2	2	1
CO2	3	3	1	1	-	-	-	-	-	-	-	1	3	2	1
CO3	3	2	1	1	-	-	-	-	-	-	-	1	3	2	1
CO4	3	2	3	1	-	-	-	-	-	-	-	1	3	3	1

Prepared by: Dr. Mohit Makkar
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Approved by: