SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Narsapur, West Godavari District, A.P. 534280

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

1	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
20RB6T03	MOBILE ROBOTS	VI	ROBOTICS	06	2024-25	18-11-2024

COURSE OUTCOMES

1	Differentiate different types of robots. [K2]
2	Analyze the mobile robot kinematics and dynamics [K4]
3	Summarize the different types of localization approach [K3]
4	Design collisions free path planning. [K2]
5	Summarize the different types of Swarm robots, Cooperative and Collaborative robots. [K2]

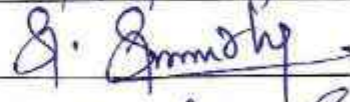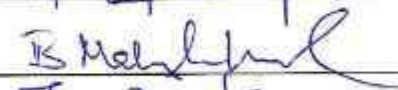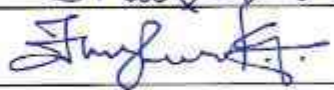| UNIT	Outcomes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
			UNIT-1 Introduction to Mobile Robots			
I	CO1: Differentiate different types of robots. [K2]	1.1	Introduction to mobile robots	T1,T2	1	Chalk & Talk PPT (Active Learning Activity)
		1.2	Introduction to mobile manipulators	T1,T2	2	
		1.3	Principle of locomotion	T1,T2	2	
		1.4	Types of locomotion	T1,T2	1	
		1.5	Types of mobile robots	T1,T2	1	
		1.6	Ground robots (wheeled and legged robots)	T1,T2	2	
		1.7	Aerial robots and underwater robots	T1,T2	1	
		1.8	Water surface robots	T1,T2	1	
				Total	11	

UNIT	Outcomes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
			UNIT-2 Kinematics and Dynamics			
II	CO2: Analyze the mobile robot kinematics and dynamics [K4]	2.1	Kinematics of wheeled mobile robot	T1,T2	1	Chalk & Talk PPT(Active Learning Activity)
		2.2	Degree of freedom and maneuverability	T1,T2	2	
		2.3	Generalized wheel model	T1,T2	1	
		2.4	Different wheel configurations	T1,T2	1	
		2.5	Holonomic and non-holonomic robots	T1,T2	1	
		2.6	Dynamics of mobile robot	T1,T2	2	
		2.7	Lagrange-Euler	T1,T2	2	
		2.8	Newton-Euler methods	T1,T2	2	
		2.9	Computer based dynamic	T1,T2	1	
		2.10	Numerical simulation of different wheeled mobile robots	T1,T2	1	
				TOTAL	14	

			UNIT-3_Localization and Mapping			
III	CO3: Summarize the different types of localization approach[K3]	3.1	Magnetic and optical position sensor	T1,R1	1	Chalk & Talk, PPT
		3.2	Mapping (SLAM)	T1,R1	1	
		3.3	Gyroscope, accelerometer	T1,R1	1	
		3.4	Magnetic compass, inclinometer, tactile and proximity sensors	T1,R1	1	
		3.5	Ultrasound rangefinder, laser scanner, infrared rangefinder	T1,R1	1	
		3.6	Visual and motion sensing systems	T1,R1	1	
		3.7	Localization, Map based localization	T1,R1	1	
		3.8	Markov localization,	T1,R1	2	
		3.9	Kalman filter localization Error propagation model	T1,R1	2	
		3.10	Probabilistic map based localization	T1,R1	1	
		3.11	Autonomous map building	T1,R1	1	
		3.12	Simultaneous localization	T1,R1	1	
			Total		**15**	

			UNIT-4_Motion Control			
IV	CO4: Design collisions free path planning. [K2]	4.1	Collisions free path planning	T2,R1	2	Chalk & Talk, PPT
		4.2	Sensor-based obstacle avoidance	T2,R1	1	
		4.3	Motion controlling methods	T2,R1	2	
		4.4	Kinematic control	T2,R1	2	
		4.5	Dynamic control	T2,R1	2	
		4.6	Cascaded control.	T2,R1	2	
			Total		**11**	

			UNIT-5_Modern Mobile Robots			
V	CO5: Summarize the different types of Swarm robots; Cooperative and Collaborative robots. [K2]	5.1	Introduction to Modern Mobile Robots	T1,T2	2	Chalk & Talk, PPT seminars
		5.2	Swarm robots	T1,T2	2	
		5.3	Cooperative and collaborative robots	T1,T2	2	
		5.4	Mobile manipulators	T1,T2	2	
		5.5	Autonomous mobile robots	T1,T2	2	
	CBS	5.6	Dijkstra's algorithm, Bug algorithms.	T1,T2	1	
			Total		**11**	
		CUMULATIVE PROPOSED PERIODS			**62**	

Swarnandhra College of Engineering and Technology
Department of Robotics Engineering

Text Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
T1	Kelly, A "Mobile Robotics: Mathematics, Models, and Methods", Cambridge University Press, USA, 2013.
T2	Dudek, M Jenkin, Computational Principles of Mobile Robotics, Cambridge University Press, USA, 2010

Reference Books:

S.No.	AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION
R1	Tzafestas, "Introduction to Mobile Robot Control, Elsevier", USA, 2014.
R2	Siegwart, R Nourbakhsh, and Scaramuzza, "Introduction to Autonomous Mobile Robots", MIT Press, USA, 2011.
R3	Choset, Lynch, S. Hutchinson, G. Kantor, W. Burgard, L. E. Kavraki, and S. Thrun, "Principles of Robot Motion:Theory, Algorithms, and Implementations", MIT Press, 2005.
R4	Thrun, W Burgard, D Fox, Probabilistic Robotics, MIT Press, USA, 2005.

Web Details

1	https://nptel.ac.in/courses/112106298
2	https://archive.nptel.ac.in/courses/112/106/112106298/
3	https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/DESIGN%20SISTEM%20DAYA%20GERAK/Designing%20Autonomous%20Mobile%20Robots%20Inside%20The%20Mind.pdf

S.NO.	Details	Name	Signature
i.	Faculty	Mr. S.SURENDAR	
ii.	Course Coordinator	Mr. S.SURENDAR	
iii.	Module Coordinator	Mr. B. MAHESH KRISHNA	
iv.	Program Coordinator	Dr. FRANCIS LUTHER KING	

Principal

3

Swarnandhra College of Engineering and Technology
Department of Robotics Engineering