SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Accredited by National Board of Accreditation, AICTE, New Delhi, Accredited by NAAC with "A" Grade – 3.32 CGPA, Recognized under 2(f) & 12(B) of UGC Act 1956, Approved by AICTE, New Delhi, Permanent Affiliation to JNTUK, Kakinada
Seetharampuram, W.G.DT., Narsapur-534280, (Andhra Pradesh)

DEPARTMENT OF ROBOTICS

TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods /Week	Academic Year	Date of commencement of Semester
	FUNDAMETALS OF ROBOTICS	III	ROBOTICS ENGINEERING	6	2024-25	30.07.2024

COURSE OUTCOMES	
1	**Demonstrate** the classification and basic components of robots. [K2]
2	**Apply** various motion analysis principles to solve problems involving Manipulator Kinematics. [K3]
3	**Apply** Jacobian and Lagrangian principles to solve manipulator Dynamics Problems. [K3]
4	Know about various path planning techniques and **analyze** different motions of robotics systems [K3]
5	**Discuss** robot programming techniques and common programming commands [K2]
6	**Explain** various robotic applications in different fields and the working of various drive systems. [K2]

UNIT	Outcomes / Bloom's Level	Topics No.	Topics/Activity	Text Book / Reference	Contact Hour	Delivery Method
I	CO1: Demonstrate the classification and basic components of robots. [K2]		**UNIT-I Introduction**			
		1.1	Introduction and History of robots,	T1,T2, R1,R2	2	Chalk and talk /ppt /quiz/ PBL/ Videos/ Animation
		1.2	Classification of robots based on several types like generations, coordinates and control system	T2,T3, R1,R3	2	
		1.3	Present status and future trends. Basic components of robotic system. Basic terminology	T1,T2, R1,R2	2	
		1.4	Accuracy, repeatability, resolution, Degree of freedom. Mechanisms and transmission,	T1,T3, R2,R3	2	
		1.5	End effectors, Grippers-different methods of gripping, Mechanical	T2,T3, R1,R2	2	

			grippers-slider crank mechanism, screw type, rotary actuators			
		1.6	Gripper types : Cam type gripper, magnetic grippers, vacuum grippers, air operated grippers, Specifications of robot	T2,T3, R1,R2	2	
Content beyond Syllabus			Linkage 3.10 software for study of DOF of various mechanical grippers		1	
			Total		**13**	
		UNIT-II MOTION ANALYSIS and MANIPULATOR KINEMATICS:				
II	CO2. Apply various motion analysis principles to solve problems involving Manipulator Kinematics. [K3]	2.1	Homogeneous transformations as applicable to rotation and translation, problems–Euler Angles	T1,T2, R1,R	3	Chalk and talk /ppt/web resources/PBL/ Videos/ Animation
		2.2	D-H Notations, joint coordinates and world coordinates	T1,T2, R1,R2	4	
		2.3	Forward and inverse kinematics, problems of simple robotic manipulators.	T1,T2, R1,R2	4	
Content beyond Syllabus			Roboanalyzer software for representing position and orientation of robots		1	
			Total		**12**	
		UNIT-III MANIPULATOR DYNAMICS:				
III	Apply Jacobian and Lagrangian principles to solve manipulator Dynamics Problems. [K3]	3.1	Differential transformation of manipulators, Jacobians	T1,T2, R1,R3	3	Chalk and talk /ppt/web resources/PBL/ Videos/ Animation
		3.2	Lagrange, Euler and Newton, Euler formulations, Problems.	T2,T3, R1,R2	3	
		3.3	ROBOT CONTROLS: Point to point control, Continuous path control, Intelligent robot	T1,T2, R1,R3	2	
		3.4	Control system for robot joint, Control actions	T1,T3, R2,R3	2	
Content beyond Syllabus			Roboanalyzer software for representing IK an FK of robots		1	
Total					**14**	
		UNIT-IV TRAJECTORY PLANNING:				
IV	Know about various path planning	4.1	Joint space scheme- cubic polynomial fit, obstacle avoidance in operation	T1,T2, R2,R3	3	

	techniques and analyze different motions of robotics systems [K3] Discuss robot programming techniques and common programming commands [K2]	4.2	space-cubic polynomial fit with via point, blending scheme.	T1,T3, R1,R2	4	Chalk and talk /ppt/web resources/PBL/ Videos/ Animation
		4.3	Introduction To Robotic Programming	T1,T2, R1,R3	2	
		4.4	methods of robot programming, WAIT, SIGNAL and DELAY commands	T1,T2, R2,R3	2	
		4.5	Programming Languages: generations of robotic languages	T1,T2, R2,R3	1	
		4.6	introduction to various types of programming	T1,T2, R2,R3	1	
		4.7	Small programs to robot control based on VAL, RAIL, AML programming	T1,T2, R2,R3	2	
Content beyond Syllabus			Robot programming languages		1	
				Total	**16**	
V	Explain various robotic applications in different fields and the working of various drive systems. [K2]	**UNIT-V ROBOT APPLICATIONS**				
		5.1	Robot applications in Material Transfer, Machine loading and un-loading operations	T1,T3, R1,R3	1	Chalk and talk /ppt/web resources/PBL/ Videos/ Animation
		5.2	Robots in processing operations - spot and continuous arc welding	T1,T2, R1,R3	1	
		5.3	Robots in spray painting, Assembly operations	T1,T2, R2,R3	1	
		5.4	Inspection, Safety in robotics, Training, maintenance	T1,T2, R1,R3	1	
		5.5	Applications of robot in Medical, agricultural and space applications.	T1,T2, R1,R2	2	
		5.6	Unmanned vehicles: Ground, Ariel and underwater applications	T1,T2, R1,R2	2	
		5.7	**DRIVE SYSTEM:** introduction to drive systems, working of hydraulic drive system	T1,T2, R1,R2	1	
		5.8	Working of pneumatic and electrical drive systems.	T1,T2, R1,R2	1	

Content beyond Syllabus			Interfacing of sensors with Arduino board		1	
				Total	11	
				Total no of hrs	66	

Text Books:	
S.No.	**AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION**
T1	Groover MP /Industrial Robotics/ 2nd /Pearson Edu /2016
T2	Mittal RK & Nagrath I J /Robotics and Control/3rd/ TMH/2015
T3	Ganesh S. Hegde/ A Textbook on Industrial Robotics/3rd/ Lakshmi Publications/2015
Reference Books:	
S.No.	**AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION**
R1	Fu K S/Robotics/3rd/ Mc Graw Hill/2017
R2	Asada and Slow time/Robot Analysis and Intelligence/ 3rd/Wiley Inter Science/2017
R3	John J Craig/Introduction to Robotics/3rd/ Pearson Edu/2015
Web Details	
	1.https://www.galileo.org/robotics/intro.html 2.https://www.robotshop.com/en/robot-parts.html 3.https://en.wikipedia.org/wiki/Robot_kinematics 4.www.scholarpedia.org/article/Robot_dynamics 5.https://www.robots.com/applications

		Name	Signature with Date
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Principal