



Course: M.Tech. (Electronics & Communication Engineering)	Name of Faculty: Dr. Tripti S Warriar
Topic: 20-437-0109 Robotics and Automation	Semester: FIRST
Lecture Hall: 118	Timings: as per CBCS, Slot D

<i>Week and date</i>	<i>Lecture topics</i>	<i>Assignments</i>	<i>Remarks</i>
Week 1 (23rd Nov 20)	<ul style="list-style-type: none"> • Introduction • Robot Classification • Types of Joints • Number of Axes and Degree of freedom 		
Week 2 (30th Nov 20)	<ul style="list-style-type: none"> • Joint Variables • Open loop and closed Loop Controllers • Resolution, Accuracy and Repeatability • Gripper 	<i>Assignment 1</i>	
Week 3 (7th Dec 20)	<ul style="list-style-type: none"> • Measurement devices • Position and Odometry sensors • Beacon and range sensors 		
Christmas Vacation			
Week 4 (29th Dec 20)	<ul style="list-style-type: none"> • Actuators • H-bridge • Pneumatic and Hydraulic Systems • Drive mechanisms 	<i>Assignment 1 submission</i>	
Week 5 (4th Jan 21)	<ul style="list-style-type: none"> • World, joint and end effector frame • Rotation Matrix & Composite Rotation Matrix • Homogenous Matrix • 		
Week 6 (11th Jan 21)	<ul style="list-style-type: none"> • Link coordinate • Denavit-Hartenberg representation • Arm equation and Tool configuration 		
Week 7 (18th Jan 21)	<ul style="list-style-type: none"> • - Velocity Kinematics • - Jacobian Singularities • - Differential motion 	<i>Assignment 2</i>	
Week 8 (25th Jan 21)	<ul style="list-style-type: none"> • Euler – LaGrange Equation • Expression of Kinetics and Potential Energy • Equation of Motion 		
Week 9 (1st Feb 21)	<ul style="list-style-type: none"> • Tech -in, Teach-through • High-level languages – robot talk, Comparison of teaching and programing methods 		
First Internals			

Week 10 (15th Feb 21)	<ul style="list-style-type: none"> • Software speedup • Robot Controllers – essential components, joint actuation and sensing 		
Week 11 (22nd Feb 21)	<ul style="list-style-type: none"> • Overload, Over current and Stall detection methods 	<i>Assignment 2 submission</i>	
Week 12 (1st Mar 21)	<ul style="list-style-type: none"> • Position, Speed, Direction Sensing 		
Week 13 (8th Mar 21)	<ul style="list-style-type: none"> • Open loop and closed Loop Controller • Linear Control Schemes- Second order Linear Systems, 		
Week 14 (15th Mar 21)	<ul style="list-style-type: none"> • Linear Second order SISO Model of a Manipulator Joint 		
Week 15 (22nd Mar 21)	<ul style="list-style-type: none"> • Joint Actuator – Model of a DC Motor 		
Second Internals			
Week 16 (29th Mar 21)	<ul style="list-style-type: none"> • PID Control Scheme 		
Week 17 (6th Apr 21)	<i>Publication of Sessional</i>		