

<b>COURSE CODE:</b> 1154EE120	<b>COURSE TITLE:</b> ROBOTICS AND AUTOMATION	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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**COURSE CATEGORY:**

University Elective

**PREAMBLE :**

To enable students to understand about the working concepts of robot and its role in automation

**PREREQUISITE COURSES:**

Basic Electrical Engineering

**RELATED COURSES:**

Control systems

**COURSE EDUCATIONAL OBJECTIVES :**

- To study the basics of robots.
- To discuss about the different actuators of Robot.
- To understand the kinematics and inverse kinematics of robots.
- To analyse the trajectory planning for robot.
- To elaborate the control of robots for some specific applications.

**COURSE OUTCOMES :**

Upon the successful completion of the course, students will be able to:

<b>CO Nos.</b>	<b>Course Outcomes</b>	<b>Knowledge Level (Based on revised Bloom's Taxonomy)</b>
CO1	Understand the basics of Robots	K2
CO2	Elaborate the function of different sensors in the robot	K2
CO3	Understand the concepts of gripper and robot control	K2
CO4	Write program to use robot for a typical application	K2
CO5	Manipulate robots in different applications	K2

**CORRELATION OF COs AND POs**

<b>COs</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO1 0</b>	<b>PO1 1</b>	<b>PO1 2</b>
<b>CO1</b>	H											
<b>CO2</b>	H							H		M	H	
<b>CO3</b>	H			H				H		M	H	
<b>CO4</b>		M	M	L		M		M		M		
<b>CO5</b>										H		

H-High: M: Medium L-Low.

<b>COURSE CONTENT :</b>		
<b>UNIT I</b>	<b>BASIC CONCEPTS</b>	<b>9</b>
Definition and origin of robotics – different types of robot – various generations of robots – degrees of freedom – Asimov’s laws of robotics – dynamic stabilization of robots.		
<b>UNIT II</b>	<b>POWER SOURCES AND SENSORS</b>	<b>9</b>
Hydraulic - pneumatic - electric drives – variable speed arrangements – path determination – micro machines in robotics – artificial intelligent– machine vision – ranging – laser – acoustic – magnetic, fibre optic and tactile sensors.		
<b>UNIT III</b>	<b>MANIPULATORS, ACTUATORS AND GRIPPERS</b>	<b>9</b>
Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – grippers – design considerations.		
<b>UNIT IV</b>	<b>KINEMATICS AND PATH PLANNING</b>	<b>9</b>
Kinematic problems - Solution of inverse kinematics problem – hill climbing techniques – robot programming languages- sliding mode control		
<b>UNIT V</b>	<b>APPLICATIONS</b>	<b>9</b>
Multiple robots – robot cell design – selection of robot – Micro and Nano robots– machine interface – robots in manufacturing and non- manufacturing applications.		
<b>TOTAL: 45 PERIODS</b>		
<b>TEXTBOOKS:</b>		
<ol style="list-style-type: none"> <li>1. Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., “Industrial Robotics”, Mc Graw-Hill Singapore, 1996.</li> <li>2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1998.</li> </ol>		
<b>REFERENCE BOOKS:</b>		
<ol style="list-style-type: none"> <li>1. Klafter R.D., Chimielewski T.A., Negin M., “Robotic Engineering – An integrated approach”, Prentice Hall of India, New Delhi, 1994..</li> <li>2. Mc Kerrow P.J. “Introduction to Robotics”, Addison Wesley, USA, 1991.</li> </ol>		