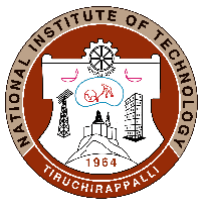


COURSE PLAN – PART I			
Name of the Programme and Specialization	M.Tech. (Industrial Automation) Instrumentation and Control Engineering		
Course Title	A. I. and Robotics Laboratory		
Course Code	IC 608	No. of Credits	2
Course Code of Pre-requisite subject(s)	Nil		
Session	January 2022	Section	N. A.
Name of Faculty	Dr. Rahul Kumar Sharma	Department	Instrumentation and Control Engineering
		Telephone No.	2503350
Name of Course Coordinator(s)	N. A.		
Official E-mail	rahul@nitt.edu	Telephone No.	2503350
Course Type (please tick appropriately)	Laboratory		
Syllabus (approved in BoS)			
<ol style="list-style-type: none"> 1. Operator Control of Robot and Jog the Robot. 2. Robot Programming: In-air program (Point-to-Point motion). 3. Robot Programming: Fillet joint weld, Circular joint weld and Linear joint weld. 4. Actuation of Pneumatic circuit for Rotary Pusher Module and Interface with Programmable Logic Control. 5. Actuation of Single Acting Cylinder using a two-way Pressure Valve using Flow Control Valve. 6. Trouble Shooting the Sensor and Actuator using MAPS-6S Multistation. 7. Simulation of movements in HMI and SCADA (using Analog data). 8. Signal Processing (A/D and D/A) using SCALEX and NORMX Blocks. 9. Execute an Instruction from the cloud to stop the machine operation. 10. Integration of MAPS-6S Automation Kit using Profinet Protocol. 11. Configure and Visualize the Thing Data using OPC-UA Protocol. 			



12. Configure and Visualize the Thing Data using Modbus Adapter.
13. Algorithm for Data Pre-Processing.
14. Development of Regression Algorithms for the given Data.
15. Implementation of Classification Algorithms.
16. Development of Deep Network Models.
17. Application and case studies related to manufacturing industries.
18. Application and case studies related to process industries.

COURSE OBJECTIVES

1. To impart knowledge on Robot Programming and Robot Operation Control.
2. To expose Students to SCADA and various Communication Protocols.
3. To understand the Machine Learning (ML) and Deep Learning (DL) models.
4. To implement the Deep Learning (DL) models for real time data.

MAPPING OF COs with POs

On completion of this course, the students will be able to,	Programme Outcomes (PO) (Enter Numbers only)
Understand the operation of Robot, select a Robot program and execute, stop and reset it in the required operating modes.	1, 2
Understand the process of conversion of digital data to analog data and vice versa for automation and gain adequate programming skills using PLC, DCS and SCADA.	1, 2, 3
Understand the AI concepts.	1, 2, 9
Implement the ML and DL concepts.	1, 2, 9

COURSE PLAN – PART II

COURSE OVERVIEW

The course introduces the Students to the Operation and Control of Robots using various techniques and programming languages.



COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	1 st Week	1. Operator Control of Robot and Jog the Robot.	Online Slides Presentation and Simulation performed by Students



2.	2 nd Week	2. Robot Programming: In-air program (Point-to-Point motion). 3. Robot Programming: Fillet joint weld, Circular joint weld and Linear joint weld.	Online Slides Presentation and Simulation performed by Students
3.	3 rd Week	4. Actuation of Pneumatic circuit for Rotary Pusher Module and Interface with Programmable Logic Control.	Online Slides Presentation and Video Demonstration
4.	4 th Week	5. Actuation of Single Acting Cylinder using a two-way Pressure Valve using Flow Control Valve.	Online Slides Presentation and Video Demonstration
5.	5 th Week	6. Trouble Shooting the Sensor and Actuator using MAPS-6S Multistation.	Online Slides Presentation and Video Demonstration
6.	6 th Week	7. Simulation of movements in HMI and SCADA (using Analog data).	Online Slides Presentation and Video Demonstration
7.	7 th Week	8. Signal Processing (A/D and D/A) using SCALEX and NORMX Blocks.	Online Slides Presentation and Video Demonstration
8.	8 th Week	9. Execute an Instruction from the cloud to stop the machine operation. 10. Integration of MAPS-6S Automation Kit using Profinet Protocol.	Online Slides Presentation and Video Demonstration
9.	9 th Week	11. Configure and Visualize the Thing data using OPC-UA Protocol. 12. Configure and Visualize the Thing data using Modbus Adapter.	Online Slides Presentation and Video Demonstration
10.	10 th Week	13. Algorithm for Data Pre-Processing. 14. Development of Regression Algorithms for the given data.	Online Slides Presentation and Simulation performed by Students
11.	11 th Week	15. Implementation of Classification Algorithms. 16. Development of Deep Network Models.	Online Slides Presentation and Simulation performed by Students
12.	12 th Week	17. Application and case studies related to manufacturing industries.	Online Slides Presentation and Simulation performed by Students



		18. Application and case studies related to process industries.		
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Continuous Assessment (Simulation/Record Submission)	During every class	Weekly	40%
2.	Online Examination	13 th Week	1 hour	30%
3.	Viva	14 th Week	-	30%
COURSE EXIT SURVEY (the ways in which the feedback about the course shall be assessed)				
Feedback from students will be obtained during the course Students' performance in test and their presentation during discussion will be used to assess the understanding level.				
COURSE POLICY (including compensation assessment to be specified)				
1.75% attendance is must, inclusive of On duty on any grounds. 5% relaxation can be considered on medical grounds. Students not acquiring the required attendance will be assigned V grade. 2. Relative grading with passing minimum of 40 % or clustering will be followed, on seeing the overall performance of the students at the end of the semester. 3. For the students missing the Assessments for medical reasons, one compensation assessment will be conducted one week before the final assessment for a weightage, equal to that of the missed assessments. But students are advised not to miss the assessments. 4. For academic dishonesty institute policy will be followed.				
<u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)				
<ul style="list-style-type: none">➤ At least 75% attendance in each course is mandatory.➤ A maximum of 10% shall be allowed under On Duty (OD) category.➤ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.				
<u>ACADEMIC DISHONESTY & PLAGIARISM</u>				
<ul style="list-style-type: none">➤ Students are expected to take the assessments seriously and do it on their own.➤ Copying from co-students and completely copying from text books should be avoided.➤ Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.				
FOR APPROVAL				
Rahul Kumar Sharma Course Faculty Dr. Rahul Kumar Sharma		 08.02.2022 CC- Chairperson Dr. G. Uma	 11.02.2022 HOD Dr. K. Dhanalakshmi	