Course Plan Part I

Name of the programme and specialization	**B.Tech- Production Engineering**		
Course Title	**PRHO11 ROBOTICS**		
Course Code	**PRHO11**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**PRPC18 Industrial Automation and Mechatronics**		
Session	**January 2022**	**Section (if, applicable)**	**3rd year A & B**
Name of Faculty	**Dr. Santosh Kumar Mishra**	**Department**	**Production**
Official Email	**santosh@nitt.edu**	**Telephone No.**	**8877115103**
Name of Course Coordinator(s) (if, applicable)			
Course Type (please tick appropriately**)**	√ **Core course**	**Elective course**	

Syllabus (approved in BoS)

Fundamentals of robotics–wrists design -end effectors –actuators -modular robots.

Robot and its peripherals-sensors, machine vision-image processing & analysis-application of artificial intelligence, voice communication-robot control units-motion controls.

Robot kinematics-homogeneous transformations-forward & inverse kinematics-problems of dynamics-differential relationships-motion trajectories-dynamics of a robot control of single multiple link robot-static force analysis.

Robot Programming -different languages-expert systems.

Robot applications in manufacturing-material transfer& machine loading/unloading-processing operations–inspection-automation-robot cell design–control–recent developments and special applications-Micro & Bio robotics.

COURSE OBJECTIVES

- To understand the fundamentals of robotics
- To perform robot programming

Course Outcomes

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with some knowledge and skills associated with robot control.

COURSE PLAN PART II

COURSE OVERVIEW

I intend to interact with the students whenever possible rather than by a strict lecture format. The lecture will include coverage of fundamentals of robotics–wrists design -end effectors –actuators -modular robots and other associated topics involving their applications. This course is designed to introduce a basic study of the robots to develop strategies and techniques for solving a wide variety of practical engineering problems and its application in the working process and management of the production unit.

This course provides an overview of robot mechanisms, dynamics, and intelligent controls. Topics include planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots, multi-rigid-body dynamics, sensors, Artificial Intelligence.

COURSE TEACHING AND LEARNING ACTIVITIES

Sl.No	Week/Contact Hours	Topic	Mode of Delivery
1.	Week 1	Fundamentals of robotics	Online Mode, PPT
2.	Week 2	wrists design, end effectors	Online Mode, PPT
3.	Week 3	Actuators, modular robots.	Online Mode, PPT
4.	Week 4	Robot and its peripherals-sensors	Online Mode, PPT
5.	Week 5	Machine vision-image processing & analysis-application of artificial intelligence, ***Ist Assessment***	Online Mode, PPT
6.	Week 6	Voice communication-robot control units-motion controls	Online Mode, PPT
7.	Week 7	Robot kinematics-homogeneous transformations	Online Mode, PPT
8.	Week 8	Forward & inverse kinematics	Online Mode, PPT
9.	Week 9	Problems of dynamics-differential	Online Mode, PPT

		relationships-motion trajectories	
10.	Week 10	Dynamics of a robot control of single multiple link robot-static force analysis. **IInd assessment**	Online Mode, PPT
11.	Week 11	Robot Programming - different languages-expert systems	Online Mode, PPT
12.	Week 12	Robot applications in manufacturing-material transfer& machine loading/unloading	Online Mode, PPT
13.	Week 13	Processing operations– inspection-automation-robot cell design	Online Mode, PPT
14.	Week 14	Recent developments and special applications-Micro & Bio robotics	Online Mode, PPT
15.	Week 15	End Semester Examination (Final Assessment)	Online Mode

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week	Duration	% Weightage
1	Ist Class Test	Week 5 23-27th Feb 2022	60 minutes	25
2	IInd Class Test	Week 10 23-27th Mar 2022	60 minutes	25
3	Assignments/Surprise test/ projects/seminar/Viva	Throughout semester		20
4	Final Assessment	Week 15 27th Apr-04th May 2022	120 minutes	30

ESSENTIAL READINGS: Textbooks, Reference books

TEXT BOOKS:

1. Mikell P Groover, "Automation, Production Systems, and Computer-Integrated Manufacturing", Pearson Education, 2015.

2. Ashitava Ghoshal, Robotics Press, Sixth impression, 2010. Hill Education Pvt. Ltd, 2010.

REFERENCES:

1. Richard D Klafter, Thomas A Chmielewski & Michael Negin, “Robotic Engineering–An Integrated Approach”, Prentice Hall, 1994
2. Deb, S.R., “Robotic Technology and Flexible Automation”, Tata McGraw Hill, 1994.

COURSE EXIT SURVEY

- Feedback from the students during class committee meetings
- Anonymous feedback through questionnaire(Mid of the semester & End of the semester)
- End semester feedback on course outcomes

COURSE POLICY (including compensation assessment to be specified**)**

- Attending all the assessments mandatory for every student
- One compensation assessment will be conducted for those students who are being physically absent for the assessment 1 and/or 2, only for the valid reason.
- Absolute/Relative grading will be adopted for the course.

Attendance Policy (A uniform attendance policy as specified below shall be followed)

- 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.

Academic Dishonesty & Plagiarism

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL

Santosh

Dr. Santosh Kumar Mishra

Course Faculty

(Dr. D. Lenin Singaravelu)

CC- Chairperson _____

HOD _____