

DEPARTMENT OF PRODUCTION ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	MECHATRONICS AND INDUSTRIAL AUTOMATION (Theory & Lab)		
Course Code	PRPC27	No. of Credits	3
Course Code of Pre-requisite subject(s)	-	-	-
Session	January 2018	Section (if, applicable)	A
Name of Faculty	Dr.K.Panneerselvam	Department	Production Engineering
Email	kps@nitt.edu	Telephone No.	04312503515
Name of Course Coordinator(s) (if, applicable)	-		
E-mail	-	Telephone No.	-
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p style="text-align: center;">PRPC27 MECHATRONICS AND INDUSTRIAL AUTOMATION (Theory & Lab)</p> <p>Introduction - overviews, principles and application of hydraulic, pneumatic, electric controls system. Hydraulic system, hydraulic components - pressure-flow-direction controls valves – proportional , servo, cartridge(logic) valves- accumulator, accessories. Hydraulic components symbols- Design and application of hydraulic circuits of machine tool, press, Mobile hydraulic. Pneumatic system, pneumatic components - pressure-flow-direction controls valves - pneumatic components symbols- Design and application of pneumatic circuits of machine tool. Semi automats-automats-transfer lines - automatic assembly - transfer devices and feeders- classifications and applications-job orienting and picking devices- setting of automats and transfer lines. Introduction to mechatronics, mechatronics system, Microprocessors and their applications, Sensors and Principles, PLC system, examples of mechatronics systems.</p> <p>https://www.nitt.edu/home/academics/curriculum/B.Tech-PR-2015.pdf</p>			
COURSE OBJECTIVES			
<ol style="list-style-type: none"> 1. Study and describe the fluid power (Hydraulic and Pneumatic) system, its components with symbols and circuits for industrial problems 2. Understand the concept and basics of Industrial automation for part picking, part orientation and transfer system 3. Understand the concept and basics PLC with Fluid power control system for the industrial circuits. 			

COURSE OUTCOMES (CO)													
Course Outcomes	Aligned Programme Outcomes (PO)												
CO1. Identify the fluid power system to meet industrial automation needs. CO2. Understand the concept and basics of Industrial automation. CO3. Apply PLCs technology in fluid power system for providing solution to industrial automation.	Program Outcomes (PO)												
		1	2	3	4	5	6	7	8	9	10	11	12
	CO1	√	√	√	√	√	√	√	√	√		√	√
	CO2	√	√	√	√	√	√	√	√	√		√	√
CO3	√	√	√	√	√	√	√	√	√		√	√	
PROGRAMME OUTCOMES (POs)													
Sl. No	Programme Outcomes (POs):												
	On successful completion of the programme the students will be able to												
1.	Graduates will apply knowledge acquired in mathematics, science, engineering and humanities to production engineering problems.												
2.	Graduates will have the ability to define the problems and provide solutions by designing and conducting experiments, interpreting and analyzing data for manufacturing.												
3.	Graduates will design manufacturing systems that would encompass machining technology, welding technology, metal forming, foundry technology and thermal engineering infrastructure and would meet specifications and requirements as demanded by the customers.												
4.	Graduates will apply design and tooling for manufacturing, finite element methods, modeling of manufacturing systems to solve production engineering problems.												
5.	Graduates understand manufacturing technologies like computer controlled processes and management information systems, production management, SCM, ERP and new manufacturing concepts like TPS, agile manufacturing, pull & push system.												
6.	Graduates will have the confidence to apply engineering solutions in global and societal Contexts.												
7.	Graduates will understand quantitative modeling and analysis of a broad array of systems-level decision problems concerned with economic efficiency, work design, productivity and quality with environmental focus.												
8.	Graduates should be capable of self-education and clearly understand the value of achieving perfection in their professional endeavors.												
9.	Graduates will participate as members of engineering and science laboratory teams, as well as members of multidisciplinary design teams.												
10.	Graduates will be proficient in English language in both verbal and written forms which will enable them to compete with graduates of international engineering institutions.												
11.	Graduates will exhibit competency in choosing and applying appropriate resource management technique(s) so as to optimally utilize resources in manufacturing systems.												
12.	Graduates will be broadly educated and will have an understanding of the impact of engineering on society and confront contemporary issues.												

COURSE PLAN – PART II

COURSE OVERVIEW

This course is to teach the principles and application of hydraulic, pneumatic, electric controls system in such a way that the students can understand and use it in practical applications. This course gives (i) Overall view of principles and application of Mechanical, hydraulic, pneumatic, electric controls system, (ii) Study on Hydraulic system, its components with symbols and Design of hydraulic circuits for industrial problems, (iii) Study on Pneumatic system, its components with symbols and Design of Pneumatic circuits for industrial problems, (iv) Study on semiautomatic system for part picking, part orientation and transfer system to Industrial automation and (v) Introduction to PLC and integrating it with Fluid power (Hydraulic and Pneumatic) system for Industrial automation.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No	Week	Topic	Mode of Delivery
1.	Weeks :1	Lecture-1. Introduction to syllabus and Course plan details Lecture-2. Introduction the moodle and registration in moodle Practical-1. Introduction to the Labs and registration in moodle	C&T/PPT
2.	Weeks :2	Lecture-3. Overviews, principles and application of hydraulic, pneumatic, electric controls system. Lecture-4. Basic of Hydraulic Power system Practical-2. Introduction to Fluidsim software's environment	C&T/PPT
3.	Weeks :3	Lecture-5. Hydraulic pumps and actuators Lecture-6. Hydraulic valves(DCV) Practical-3. Exercise-1	C&T/PPT
4.	Weeks :4	Lecture-7. Hydraulic valves(FCV) Lecture-8. Hydraulic valves(PCV) Practical-4. Exercise-2	C&T/PPT
5.	Weeks :5	Lecture-9. Accumulators and accumulator circuits Lecture-10. Actuator control 5/2 valve Practical-5. Exercise-3	C&T/PPT
6.	Weeks :6	Lecture-11. Sequential control for Repeated pattern Lecture-12. Hydraulic circuit design for Engineering application Practical-6. Exercise-4	C&T/PPT
7.	Weeks :7	Assignment-1 and Cycle Test-1(online test in Moodle flat form)	
8.	Weeks :8	Lecture-13. Introduction to Pneumatic system Lecture-14. Pneumatic Control System components Practical-7. Exercise-5	C&T/PPT
9.	Weeks :9	Lecture-15. Pneumatic sequential Control System Lecture-16. Logic functions for poppet and spool valves Practical-8. Exercise-6	C&T/PPT
10.	Weeks :10	Lecture-17. Electro Hydraulic /Pneumatic system Lecture-18. Pneumatic circuit design for Engineering application Practical-9. Exercise-7	C&T/PPT
11.	Weeks :11	Lecture-19. Semi automats-automats-transfer lines -automatic assembly Lecture-20. Transfer devices and feeders-classifications and applications Practical-10. Exercise-8	C&T/PPT
12.	Weeks :12	Assignment-2 and Cycle Test-2(online test in Moodle flat form)	
13.	Weeks :13	Lecture-21. Introduction to PLC system Lecture-22. Applications Sensors and PLC system Practical-11. Exercise-9	C&T/PPT
14.	Weeks :14	Lecture-23. Applications of PLC system in Fluid power control system Lecture-24. Applications of PLC system in Fluid power control system Practical-12. Exercise-10	C&T/PPT
15.	Weeks :15	Buffer week for Theory /Lab Class	C&T/PPT
16.	Weeks :16	Compensation Assessment	
17.	Weeks :17	Final Assessment *(End Semester Examinations for all B.Tech.)	

C & T : Chalk and Talk PPT : Power Point

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

	S.no.	Mode of assessment for theory	Week /date	Duration	Wt. %	Wt. % for final grading
Theory	1	Assignment-1	Week-7		10	66.666
	2	Cycle Test-1	Week-7	60 Minutes	15	
	3	Assignment-2	Week-12		10	
	4	Cycle Test-2	Week-12	60 Minutes	15	
	5	Compensation Assessment*	Week-16	60 Minutes	15	
	6	End Semester Examinations	Week-17	120 Minutes	50	
Lab	1	Continuous assessment for 10 lab exercises			100	33.333
Final Assessment for grading						100

Important Note:

1. Attending all the assessments (Assessment – 1-4 and 6) are MANDATORY for every student.
2. If any student is not able to attend any one of the Assessment between (Assessment -1 to Assessment-4) due to genuine reason, student is permitted to attend the Compensation Assessment* with 15% weightage (15 marks).
3. In any case, Compensation Assessment* will not be considered as an improvement test.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Mention the ways in which the feedback about the course is assessed and indicate the attainment also:

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

MODE OF CORRESPONDENCE (email/ phone etc.)

1. All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes schedule of assessment course material any other information regarding this course) will be done through their webmail only.
2. Queries (if required) may be emailed to me / contact me during 4.00 pm to 5.00 pm on Monday and Friday with prior intimation for any clarifications.

ATTENDANCE

Attendance will be taken by the course faculty in all the contact hours.

ACADEMIC HONESTY & PLAGIARISM

Copying in any form during assessments is considered as academic dishonesty and will attract suitable penalty.

ADDITIONAL COURSE INFORMATION

The faculty is available for consultation at times as per the intimation given by the faculty.

Queries may also be emailed to the Course Faculty directly at kps@nitt.edu

FOR APPROVAL


Course Faculty


CC Chairperson


HOD