

<b>GANPAT UNIVERSITY</b>									
<b>FACULTY OF ENGINEERING &amp; TECHNOLOGY</b>									
Programme		Master of Technology			Branch/Spec.		Mechanical Engineering		
Semester		I			Version		2.0.0.0		
Effective from Academic Year			2020-21		Effective from the batch Admitted in			July-2021	
Subject code		3ME1105		Subject Name		<b>Manufacturing Automation</b>			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50
<b>Pre-requisites:</b>									
<b>Student should have:</b>									
<ul style="list-style-type: none"> <li>• Basic knowledge of fluid mechanics,</li> <li>• Concept of automation,</li> <li>• Concept of electronics.</li> </ul>									
<b>Learning Outcome:</b>									
<b>After learning this course, the student would be able to:</b>									
<ul style="list-style-type: none"> <li>• Understand the different types of automation for the Industries.</li> <li>• Basic concept of microcontroller used for automation.</li> <li>• Understand different types of sensors for the different applications.</li> <li>• Understand of PLC and programming for the automatic manufacturing applications.</li> <li>• Basic concept of hydraulic and pneumatic systems and the circuits for the applications.</li> <li>• Perform practical in the laboratory on microcontroller, PLC &amp; HPS.</li> </ul>									
<b>Theory syllabus</b>									
Unit	Content								Hrs
1	<b>INTRODUCTION:</b> Modern developments in automation in manufacturing and its effect on global competitiveness, Need and implications of automation in Manufacturing. Introduction to Mechatronics, Need of Mechatronics in measurement systems, Control systems, Traditional design.								4
2	<b>FEEDBACK DEVICES:</b> Introduction of sensors and transducers , Performance terminology, Displacement, Position and proximity, Velocity and motion, Fluid pressure, Temperature sensors - Light sensors, Selection of sensors, Signal processing, Servo systems.								10
3	<b>MICROCONTROLLER:</b> Introduction of microprocessors and microcontrollers , Pin configuration of AVR Microcontroller, Instruction sets, C Programming using AVR Microcontroller instructions , Interfacing input and output devices, Interfacing D/A converters and A/D converters , Applications - Temperature control, Stepper motor control, Traffic light controller.								8
4	<b>PROGRAMMABLE LOGIC CONTROLLERS (PLC):</b> Introduction, Basic structure, Input/output processing, Programming, timers, Internal relays and counters, Data handling, Analog input/output, Selection of PLC.								12
5	<b>HYDRAULIC &amp; PNEUMATIC SYSTEMS:</b> Hydraulic and pneumatic actuators, their design and control devices, sequence operation of hydraulic/pneumatic actuators, designing of complete systems with hydraulic, electrohydraulic, Low cost automation, Introduction to software of hydraulic and Pneumatic system, Designing of different circuit in software, internal simulation in software , simulation with actual component using software like automation in industry, Control of single acting and double acting cylinder, Meter in and meter out circuits, Speed control of a cylinder, Sequencing of motions, Automatic cylinder reciprocating.								7

6	<b>MANUFACTURING SYSTEM DESIGN BY MECHATRONICS:</b> Designing, Possible design solutions, Case studies of Mechatronics systems.	4
<b>Practical content</b>		
The term work shall be based on experimental and analytical work on the topics mentioned above and will be defended by the candidates.		
<b>Text Books</b>		
1	W.Bolton, 'Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering', 3rd Edition, Prentice Hall; (15 May 2003)	
2	Garry Duning, 'Programmable Logic Controller', 3rd Edition, Cengage Learning	
<b>Reference Books</b>		
1	D.A.Bradley, D.Dawson, N.C.Burd and A.J.Loader, 'Mechatronics- Electronics in products and processes 1996.	
2	Kenneth J. Ayala 'The 8051 micro controller-Architecture, programming and application', 3rd Editio, Thomson learning	
3	Muhmmad Ali Mazidi 'The 8051 micro controller and Embedded system', 2nd Edition, PHI Publication	
4	W. Bolten, 'Programmable Logic Controller', 2nd Edition, Elsevier Newner Anthony Esposito "Fluid Power Systems", Prentice Hall	
<b>Mooc Links:</b>		
1	Industrial Automation and Control: <a href="https://nptel.ac.in/courses/108/105/108105088/">https://nptel.ac.in/courses/108/105/108105088/</a>	
2	PLC: <a href="https://www.udemy.com/course/plc-programming-from-scratch/">https://www.udemy.com/course/plc-programming-from-scratch/</a>	
<b>Course Outcomes:</b>		
<ol style="list-style-type: none"> <li>1. Understand needs of automation and select Microcontroller, sensors, Hydraulics and Pneumatics systems</li> <li>2. Write Microcontroller and PLC programs</li> <li>3. Select sensor based on their static or dynamic characteristics</li> <li>4. Build Hydraulics and Pneumatics circuits</li> </ol>		