

<b>GANPAT UNIVERSITY</b>										
<b>FACULTY OF ENGINEERING &amp; TECHNOLOGY</b>										
Programme		Bachelor of Technology				Branch/Spec.		Mechanical Engineering		
Semester		VIII				Version		2.0.0.0		
Effective from Academic Year			2021-22			Effective from the batch Admitted in			July 2018	
Subject code		<b>2ME81PE4</b>		Subject Name		<b>Industrial Automation</b>				
Teaching scheme					Examination scheme (Marks)					
(Per week)	Lecture(DT)		Practical(Lab.)		Total		C E	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>• Knowledge of Basic Electrical Engineering</li> <li>• Basic Electronics</li> <li>• Digital Electronics</li> <li>• Electronics Measurement and Instrument</li> </ul>										
<b>Course Objective:</b>										
<ul style="list-style-type: none"> <li>• Understand concept of automation and used of Mechanism of low cost Automation and component used for Automation.</li> <li>• Choose the appropriate Sensor, Microprocessor, controller &amp; PLC and Machine vision system for a given application.</li> <li>• Explain the basic principles of programming and apply it and Identify suitable automation hardware for the given application.</li> </ul>										
<b>Theory syllabus</b>										
Unit	Content								Hrs	
1	<b>GENERAL CONCEPTS:</b> General concepts of the industrial production. Concepts of production systems and production Processes, Automation production systems and their classification.								4	
2	<b>LOW COST AUTOMATION:</b> Application of Cam, Linkages, Conveyors and Feeders, Rotary Indexing Systems and GENEVA mechanisms etc.								3	
3	<b>SENSOR TECHNOLOGY:</b> Terminology, classification of sensors, sensor characteristics, General Input-Output Configuration, Static Characteristics, Dynamic Characteristics, Physical Principles of Sensing, sensors in different areas, Sensor Materials, sensor applications in various fields, calibration								7	
4	<b>MICROPROCESSOR AND MICROCONTROLLERS:</b> Microprocessor evolution, overview of architecture of 8-bit microprocessor (8085), overview of 8051 microcontroller architecture, AVR Microcontroller architecture, features, Pin diagram, ports and circuits, basic concepts for programming, Interfacing overview with peripheral devices and Applications.								7	

5	<b>PROGRAMMABLE LOGIC CONTROLLER (PLC):</b> Architecture by block diagram, I/O modules- analog-digital input and output modules, PLC programming, Ladder diagram, Sequential flow chart, PLC Communication and networking, PLC selection, PLC Installation, Advantage of using PLC for Industrial automation, Application of PLC to process control industries, PLC ports, Memory and storage, programming language- ladder diagram and its application	10
6	<b>DISTRIBUTED CONTROL SYSTEM:</b> Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS	7
7	<b>HUMAN-MACHINE INTERFACE:</b> man-machine interface, process control hardware, process related interfaces, networking protocols, Industrial communication systems, Data transfer techniques, data acquisition system, Internet of things (IOT) for plant automation.	7
The Practical/term work shall be based on the topics mentioned above and will be defended by the candidates.		
<b>Text Books</b>		
1	Jon S Wilson, "Sensor Technology Handbook", Newness Publishers, 2004.	
2	Muhmmad Ali Mazidi "The AVR Microcontroller and Embedded system using assembly and C-" Pearson Publication.	
3	Garry Duning, "Programmable Logic Controller", Cengage Learning, 3 <sup>rd</sup> Edition.	
4	Automation, Production Systems and Computer Integrated Manufacturing-M. P. Groover, Pearson Education.5 <sup>th</sup> Edition.	
<b>Reference Books</b>		
1	J. Fraden, "Handbook of Modern Sensors: Physical, Designs, and Applications", AIP Press, Springer. 4 <sup>th</sup> Edition.	
2	Kenneth J. Ayala "The 8051 Microcontroller-Architecture, programming and application." Thomson learning 2 <sup>nd</sup> Edition.	
3	R.S. Gaonkar "Microprocessor Architecture, Programming and Applications with 8085" Penram international Publication, 3 <sup>rd</sup> Edition.	
4	W. Bolten, "Programmable Logic Controller", Elsevier Newness Publication, 4 <sup>th</sup> Edition.	
5	B. R. Mehta, Y. Jaganmohan Reddy, "Industrial process automation systems" . 1 <sup>st</sup> Edition.	
<b>Moc 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	Industrial Automation and Control: <a href="https://nptel.ac.in/courses/108/105/108105062/">https://nptel.ac.in/courses/108/105/108105062/</a>	
3	PLC: <a href="https://www.udemy.com/course/plc-programming-from-scratch/">https://www.udemy.com/course/plc-programming-from-scratch/</a>	
4	Sensors and Actuators: <a href="https://nptel.ac.in/courses/108/108/108108147/">https://nptel.ac.in/courses/108/108/108108147/</a>	
5	Microprocessor and Microcontrollers: <a href="https://nptel.ac.in/courses/108/105/108105102/">https://nptel.ac.in/courses/108/105/108105102/</a>	
<b>Course Outcomes:</b>		
<b>After learning this course, student should be able to:</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> <li>5. Implement IOT based systems</li> </ol>		