

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)					
AY 2023-24					
Course Information					
<b>Programme</b>		B.Tech. (Electrical Engineering)			
<b>Class, Semester</b>		Final Year B. Tech., Sem VII			
<b>Course Code</b>		5OE443			
<b>Course Name</b>		Open Elective 5: Industrial Automation			
<b>Desired Requisites:</b>		Basic Electrical Engineering, Basic Mechanical Engineering			
Teaching Scheme		Examination Scheme (Marks)			
<b>Lecture</b>	3 Hrs/week	<b>MSE</b>	<b>ISE</b>	<b>ESE</b>	<b>Total</b>
<b>Tutorial</b>	-	30	20	50	100
<b>Practical</b>	-	Nil			
<b>Interaction</b>	-	<b>Credits: 3</b>			
Course Objectives					
<b>1</b>	This course intends to develop basics of ladder logic programming for PLC.				
<b>2</b>	It provides the foundation level knowledge of SCADA System.				
<b>3</b>	It gives overview of various types of controller for closed loop control.				
<b>4</b>	It provides the applications of variable speed drives in industries.				
Course Outcomes (CO) with Bloom's Taxonomy Level					
<b>CO1</b>	<b>Explain</b> the working of various types of measuring instruments, controllers and actuators for implementation in industrial automation.				Understand
<b>CO2</b>	<b>Identify</b> the use of various actuators in industrial automation				Apply
<b>CO3</b>	<b>Apply</b> the knowledge of PLC and SCADA for Industrial Automation.				Apply
<b>CO4</b>	<b>Explore</b> the use of variable speed drives for Industrial Automation.				Apply
Module	Module Contents				Hours
I	<b>Measurement of Various Process Parameters</b> Measurement of quantities such as temperature, pressure, force, displacement, speed, flow, level, humidity, pH etc., signal conditioning, estimation of errors and calibration.				6
II	<b>Process Control and Various Controllers</b> Introduction to process control, PID controller and tuning, various control configurations such as cascade control, feed forward control, split range control, ratio control, override control and selective control.				6
III	<b>Actuators</b> Introduction to various actuators such as flow control valves, Hydraulic and pneumatic, servo motors, symbols and characteristics.				6
IV	<b>PLC</b> Introduction to sequence control and relay ladder logic, basic PLC system, I/O modules, scan cycle, programming of timers, counters and I/O programming.				6
V	<b>SCADA for Industrial Automaton</b> Components of SCADA systems, functions, classification of SCADA, networking and communication protocols.				6
VI	<b>Variable Speed Drives</b> Role of variable speed drives in automation, DC drives, AC drives and synchronous motor drives applications of variable speed drives.				6
Text Books					
1	John W. Webb, Ronald A. Reis " <i>Programmable logic controllers, principles &amp; applications</i> " by PHI publication, Eastern Economic Edition.				
2	C. D. Johnson, " <i>Process control &amp; instrumentation techniques</i> ". Pearson Education				

References	
1	George Stephanopoulos, “ <i>Chemical Process Control - An introduction to Theory and Practice</i> ”, Prentice-Hall of India, 1st Edition 1984.
2	“ <i>Fundamentals of Electrical Drives</i> ”, G. K. Dubey, Narosa publication, 2nd edition.
Useful Links	
1	<a href="https://nptel.ac.in/courses/108105063">https://nptel.ac.in/courses/108105063</a>
2	<a href="https://archive.nptel.ac.in/courses/108/106/108106022/">https://archive.nptel.ac.in/courses/108/106/108106022/</a>

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>CO1</b>		2													
<b>CO2</b>		2			2										
<b>CO3</b>						2								2	
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.															

Assessment
<p>The assessment is based on MSE, ISE and ESE.</p> <p>MSE shall be typically on modules 1 to 3.</p> <p>ISE shall be taken throughout the semester in the form of teacher’s assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.</p> <p>ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.</p> <p>For passing a theory course, Min. 40% marks in (MSE+ISE+ESE) are needed and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing)</p>