Module   Module Contents   Hours     I   Measurement of Various Process Parameters Measurement of quantities such as temperature, pressure, force, displacement, speed, flow, level, humidity, pH etc., signal conditioning, estimation of errors and calibration.   6     II   Process Control and Various Controllers 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   Introduction to various actuators such as flow control valves, Hydraulic and pneumatic, servo motors, symbols and characteristics.   6     IV   PLC 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   SCADA for Industrial Automaton Components of SCADA systems, functions, classification of SCADA, networking and communication protocols.   6     VI   Variable Speed Drives Role of variable speed drives in automation, DC drives, AC drives and synchronous motor drives applications of variable speed drives.   6     1   John W. Webb, Ronald A. Reis "Programmable logic controllers, principles & application by PHI publication, Eastern Economic Edition.   6	Progr				of Engineering							
Course Information       Programme     B. Tech. (Electrical Engineering)       Class, Semester     Final Year B. Tech, Sem VII       Course Code     50E443       Course Name     Open Electrics 1: Industrial Automation       Desired Requisites:     Basic Electrical Engineering       Teaching Scheme     Examination Scheme (Marks)       Lecture     3 Hrs/week     MSE     ISE     ESE     Total       Practical     -     30     20     50     100       Practical     -     30     20     50     100       Practical     -     Credits: 3     100     100       Practical     -     Credits: 3     100       This course intends to develop basics of ladder logic programming for PLC.     1     I provides the foundation level knowledge of SCADA System.     3       3     It gives overview of various types of controller for closed loop control.     4     1     Understa       4     It provides the course COO with Bloom 'T Taxonomy Level     COU     Explain the working of various types of measuring instruments, controllers and acturos for implemementation in industrial automation.     Appl </th <th>Progr</th> <th></th> <th></th> <th>1</th> <th></th> <th>nstitute)</th> <th></th>	Progr			1		nstitute)						
Programme   B. Tech. (Electrical Engineering)     Class, Semester   Final Year B. Tech., Sem VII     Course Code   SOE443     Course Name   Open Elective 5: Industrial Automation     Desired Requisites:   Basic Electrical Engineering, Basic Mechanical Engineering     Teaching Scheme   Examination Scheme (Marks)     Lecture   3 Hrs/weck   MSE   ISE   Total     Tutorial   -   30   20   50   100     Practical   -   Nil   Interaction   -   Open Electives   Total     Interaction   -   Open Conse Objectives   -   Total     Interaction   -   Ocurse Objectives   -   -   Open Consel Cooled loop control.     I gives overview of various types of controller for closel loop control.   -   Appl     CO1   Explain the working of various types of measuring instruments, controllers and actuators for implementation in industrial automation.   Appl     CO2   Heritity the use of various spees of rundustrial Automation.   Appl     CO3   Apply the knowledge of PLC and SCADA for Industrial Automation.   Appl     CO4   Explore the use of variable speed drives frand t	Progr											
Class, Semester     Final Year B. Tech., Sem VII       Course Code     SOE443       Course Name     Open Elective 5: Industrial Automation       Desired Requisites:     Basic Electrical Engineering, Basic Mechanical Engineering       Teaching Scheme     Examination Scheme (Marks)       Lecture     3 Hrs/week     MSE     ISE     ESE     Total       Tutorial     -     30     20     50     100       Practical     -     30     20     50     100       Practical     -     NII     1     1     100       This course intends to develop basics of ladder logic programming for PLC.     2     1     1 provides the foundation level know ledge of SCADA System.     3     1 <t< th=""><th></th><th>amme</th><th></th><th></th><th></th><th></th><th></th></t<>		amme										
Course Code     SOE443       Course Name     Open Elective 5: Industrial Automation       Desired Requisites:     Basic Electrical Engineering, Basic Mechanical Engineering       Teaching Scheme     Examination Scheme (Marks)       Lecture     3 Hrs/week     MSE     ISE     ESE     Total       Tutorial     -     30     20     50     100       Practical     -     30     20     S0     100       Practical     -     Credits: 3     Tits course intends to develop basics of ladder logic programming for PLC.     1       1     This course intends to develop basics of ladder logic programming for PLC.     1     1       2     It provides the foundation level know ledge of SCADA System.     3     1     1       3     It gives overview of various types of controller for closed loop control.     4     1     1     Understa       4     It provides the applications of variable speed drives in industrial automation.     Apply     Apply       CO1     Explain the working of various such as temperature, pressure, force, displacement, speed, flow, keel, humidity, pH etc., signal conditioning, estimation of errors and calibration.     Appl												
Course Name     Open Elective 5: Industrial Automation       Desired Requisites:     Basic Electrical Engineering, Basic Mechanical Engineering       Teaching Scheme     Examination Scheme (Marks)       Lecture     3 Hrs/week     MSE     ISE     ESE     Total       Tutorial     -     30     20     50     100       Practical     -     30     20     50     100       Practical     -     Course Objectives     101     11     11       Interaction     -     Course Objectives     11 <t< td=""><th></th><td></td><td></td><td colspan="9"></td></t<>												
Desired Requisites:     Basic Electrical Engineering, Basic Mechanical Engineering       Teaching Scheme     Examination Scheme (Marks)       Lecture     3 Hrs/week     MSE     ISE     ESE     Total       Tutorial     -     30     20     50     100       Practical     -     Credits: 3     100     100       Interaction     -     Credits: 3     100       Interaction     Various types of controller for closed loop control.     4     1     1 provides the applications of variable speed drives in industries.     00     100       COI     Explain the working of various types of measuring instruments, controllers and actuators for implementation in industrial automation.     Appl     Appl       CO3     Apply the knowledge of PLC and SCADA for Industrial Automation.												
Teaching Scheme     Examination Scheme (Marks)       Lecture     3 Hrs/week     MSE     ISE     ESE     Total       Tutorial     -     30     20     50     100       Practical     -     30     20     50     100       Practical     -     Course Objectives     100     100       Interaction     -     Credits: 3     100       This course intends to develop basics of ladder logic programming for PLC.     2     1 It gives overview of various types of controller for closed loop control.     4     1 It provides the applications of variable speed drives in industrias.     Course Outcomes (CO) with Bloom's Taxonomy Level     CO1       CO1     Explain the working of various types of measuring instruments, controllers and actuators for inplementation in industrial automation.     Appl     Appl       CO2     Identify the use of various actuators in industrial Automation.     Appl       CO3     Explain the working of various spees of measuring instruments, controllers and actuators for inplementation in industrial automation.     Appl       CO4     Explain the working of various spees of and SCADA for Industrial Automation.     Appl       CO4     Explore the use of various control			ites•	<u> </u>	-							
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2 C. D. Johnson, " <i>Process control &amp; instrumentation techniques</i> ". Pearson Education		John	W. Webb, Ron	ald A. Reis "Progr	ammable logic	controllers, principles &	applications"					

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

CO-PO Mapping															
	Programme Outcomes (PO)												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		2													
CO2		2			2										
CO3						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

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISEshall 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.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

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)