

Open Elective Course
Instrumentation & Control Dept.

Sr. No	Course Type	Course Name	L	T	P	S	Cr	Evaluation Scheme				
								Theory			Laboratory	
								MSE	TA	ESE	ISE	ESE
1	OE-1 (Sem – III)	Sensors and Actuators	2	0	0	1	2	30	20	50	0	0
2	OE-2 (Sem – IV)	Feedback Control System	2	0	0	1	2	30	20	50	0	0
3	OE-3 (Sem – V)	Industrial Automation	2	0	0	0	2	30	20	50	0	0

Semester III

Sensors and Actuators						
Course Code			Examination Scheme			
Teaching Scheme	2-0-0-1		Theory	TA: 20	MSE: 30	ESE: 50
Credits	2		Laboratory	CIE: 00	ESE: 00	--
Course Outcomes: Students will be able to:						
1. Select and specify a sensor actuator system for an application 2. Implement a sensor and actuator system for discrete and continuous processes 3. Identify the lacunas in the existing sensors selection and suggest improvements 4. Troubleshoot the given sensors and actuators systems and commission it in a stipulated time 5. Develop a proto-type for effective implementation of automation at level zero						
Unit I Overview of discrete and continuous processes						[7 hrs]
Block schematic of control loops, requirements, specifications, cost considerations, Types of operations, various parameters to assess performance						
Unit II Sensors						[7 Hrs]
Static and dynamic characteristics, Working, selection, specifications, installation, commissioning, and troubleshooting of various sensors used for measurement of displacement, velocity, and acceleration, temperature etc.						
Unit III Actuators						[7 Hrs]
Types of actuators, pneumatic, hydraulic and electric, Working, selection, and troubleshooting, Case studies comprising of application of actuator knowledge in real life situations						
Unit IV Case studies						[7 Hrs]
Case studies for various applications for manufacturing, construction, refrigeration, automotive, and traffic control systems, based on various applications and interfacing of sensors in chosen fields, actuators, safety aspects, maintenance and troubleshooting of sensor actuator systems						
Textbooks:						
[1]	A K Sawhney Electrical and Electronics Measurement, Dhanpat Rai & Co					
[2]	S R Majumdar, Pneumatic System, Mc Graw Hill Publications					
Reference Books:						
[1]	Process control Instrumentation Technology by C D Johnson, Pearson Publication					
[2]	Process Control, Instrument Engineering Handbook by B G Liptak, CRC Press					

Semester IV

Feedback Control System						
Course Code			Examination Scheme			
Teaching Scheme	2-0-0-1		Theory	TA: 20	MSE: 30	ESE: 50
Credits	2		Laboratory	CIE: 00	ESE: 00	--
Course Outcomes: Students will be able to:						

Semester V

Industrial Automation						
Course Code			Examination Scheme			
Teaching Scheme	2-0-0-0		Theory	TA: 20	MSE: 30	ESE: 50
Credits	2		Laboratory	CIE: 00	ESE: 00	--
Course Outcomes: Students will be able to:						
1. Select appropriate field instruments and automation components for specified industrial requirements. 2. Design automation solutions for engineering applications using suitable control and instrumentation systems. 3. Implement automation strategies to control and optimize industrial operations. 4. Evaluate the performance and effectiveness of automated systems based on operational requirements.						
Basics of Automation						[6 Hrs]
Introduction and evolution of Automation, Feedback and feed forward systems, Hierarchical levels of automation, introduction to plant automation.						
Field Instruments						[6 Hrs]
Standard signals, types of switches, working of transmitters, Types of transmitters, calibration of transmitters, types of valves used in Industries, working principle of pneumatically operated control valve and motorized control valve, Pneumatic direction control valves, pressure regulator, pressure relief valve, hydraulic direction control valves, electropneumatic valve						
Programmable Logic Controller						[6 Hrs]
Block schematic of PLC, Programming languages, basic instruction for programming, Demonstration of PLC functioning and development of ladder for sequencing of motors, tank level control, temperature control. working and automation of pump house, Motor Control Centre (MCC), elevator, Sequencing of pneumatic cylinders, bottle filling application. Introduction to SCADA and HMI.						
Advances in Automation						[6 Hrs]
Communication protocols, HART, Fieldbus, ControlNet, wireless communication, Distributed Control System, Plant wide automation						
Textbooks:						
[1]	Process control Instrumentation Technology by C D Johnson, Pearson Publication					
[2]	Programmable Logic Controllers by Garry Dunning, 3rd Ed, PHI Pub. 2004.					
Reference Books:						
[1]	Process Control, Instrument Engineering Handbook by B G Liptak, CRC Press					
[2]	Process software and Digital Network Handbook by B G Liptak, CRC Press					