

PROFORMA FOR MODIFIED COURSE

1.	Title of the course	Control and Automation Laboratory
2.	Course number	EE4191
3.	Status of the course	Core
4.	Structure of credits	0-0-3-2
5.	Offered to	UG
6.	New course/modification to	Modification to EE4191
7.	To be offered by	Department of Electrical Engineering
8.	To take effect from	July 2020
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective(s): To introduce various interdisciplinary experimental modules required for the automation industry.	
12.	Course Content: Solar energy training system: solar energy emulator to emulate the output of a solar panel under different environmental conditions; Wind turbine training system: experiments for performance analysis and to determine relevant coefficients; Programmable logic controllers (PLC), ladder logic and functional block diagram (FBD) programming for control of DC motor, VFD, and star-delta starter; Level control of a four tank system; Robotics: experiments on the control of omnidirectional and five-axis arm robot; Internet of Things (IoT) experiments; Electro-pneumatics and electro-hydraulics systems: experiments on pneumatic and hydraulic circuits using FluidSim software; Hardwired and PLC based control of pneumatic and hydraulic systems.	
13.	Textbook(s): 1. Kothari D P, <i>Renewable Energy Sources and Emerging Technologies</i> , 2nd Edition, Prentice Hall (2014). 2. Parr A, <i>Hydraulics and Pneumatics</i> , 3rd Edition, Elsevier (2010).	
14.	Reference(s): 1. Curtis J D, <i>Process Control Instrumentation Technology</i> , 8th Edition, Prentice Hall (2005). 2. Hackworth J R, <i>Programmable Logic Controllers - Programming Methods and Applications</i> , 3rd Edition, Pearson Education India (2003). 3. Hughes C, <i>Robot Programming - A Guide to Controlling Autonomous Robots</i> , 4th Edition, Que Publishing (2016).	