ADVANCED CONTROL SYSTEMS LAB

Paper Code: ETEE-453	**L**	**T/P**	**C**
Paper: Advanced Control Systems Lab	**0**	**2**	**1**

Course Outcome:	
At the end of the course, the student will be able to:	
CO.ETEE453.1	To create and analyse state space model of a given system.
CO.ETEE453.2	Formulate time and frequency response of a given system.
CO.ETEE453.3	Evaluate phase plane trajectory for a given non-linear system.
CO.ETEE453.4	Create and design controller for a practical system in SCI Lab.

List of Experiments:

1. Study of open loop and closed loop time/frequency responses of first/second order LTI system.
2. Conversion of transfer functions to state model of LTI system and vice versa.
3. Determine State Space Model of a given system and determine its observability and controllability.
4. Analysis of Zero order hold and first order hold circuits.
5. Conversion of transfer functions to state model of discrete time system.
6. To determine state transition matrix of a given system.
7. Study of saturation and dead zone non-linearity using describing function technique of a relay control system.
8. To draw phase trajectory of a given non-linear system.
9. Experiments based on PLC applications e.g., Lift control models, pick and place module, etc.
10. Study of operation of a stepper motor interface with microprocessor.

NOTE: - At least 8 Experiments out of the list must be done in a semester.

List of Experiments		
Exp No	**CO**	**Experiment**
Exp 1	**CO2**	Study of open loop and closed loop time/frequency responses of first/second order LTI system.
Exp 2	**CO1**	Conversion of transfer functions to state model of LTI system and vice versa.
Exp 3	**CO1**	Determine State Space Model of a given system and determine its observability and controllability.
Exp 4	**CO2**	Analysis of Zero order hold and first order hold circuits.
Exp 5	**CO1**	Conversion of transfer functions to state model of discrete time system.
Exp 6	**CO1**	To determine state transition matrix of a given system.
Exp 7	**CO3**	Study of saturation and dead zone non-linearity using describing function technique of a relay control system.
Exp 8	**CO3**	To draw phase trajectory of a given non-linear system.
Exp 9	**CO4**	Experiments based on PLC applications e.g., Lift control models, pick and place module, etc.
Exp 10	**CO4**	Study of operation of a stepper motor interface with microprocessor.
Extra 1	**CO4**	Analysis and Comparison of PID, Feedforward, and Cascade Control using MATLAB.
Extra 2	**CO4**	Implementation of Adaptive Control Strategy for an LTI System with Uncertainties/Disturbances using MATLAB.