**Control System Lab**

**Code: EC583**

**Contact: 3P**

**Credits: 2**

Syllabus:

1) Familiarization with MATLAB Control System tool Box, MATLAB- SIMULINK tool box & pSPICE.-3 period

2) Determination of step response for 1st order & 2nd order system with amity feedback on CRO & calculation of control system specifications for variations of system design.-3 period

3) Simulation of step response & impulse response for Type-I & Type-II system with unity feedback using MATLAB & pSPICE.-3 period

4) Determination of root locus, Bode-plot, Nyquist Plot, using MATLAB control system toolbox for a given 2nd order transfer function & determination of different control system specifications.-6 period

5) Determination of PI, PD, and PID controller action on 1st order simulated process.-3 period

6) Determination of approximate transfer function experimentally using Bode Plot.-3 period

7) Evaluation of steady-state error, setting time, percentage peak overshoots, gain margin, phase margin with addition of lead compensator in forward path transfer functions using MATLAB & pSPICE.-3 period

8) Study of position control system using servomotor.-3 period

9) Design and hardware implementation of a temperature controller using microprocessor/microcontroller.-6 period

Course outcome:

|  |  |
| --- | --- |
| CO | Statement |
| CO1 | Explain the mathematical techniques of system module analysis with the software, such as MATLAB Control System tool Box, MATLAB- SIMULINK tool box & p-SPICE. |
| CO2 | Classify the step response for 1st order & 2nd order system along with the continuous and discrete time control techniques, including analog and digital PI, PD, PID controllers, fuzzy logic controllers, neural network controllers, root locus, Bode-plot, Nyquist Plot. |
| CO3 | At the next level, students are capable to design the multivariable control (control of several interacting variables of a physical process) and strategies for multivariable processes. |
| CO4 | Finally, evaluate some basic concepts in nonlinear control, steady-state error, setup time, percentage peak overshoots, gain margin, phase margin along with the lead compensator in forward path transfer functions. |
| CO5 | Design of a temperature controller and position controller system with servomotor and microprocessor/microcontroller. |