**23EE22P2- Control Systems Lab**

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| **Course Category:** | Professional core | **Credits:** | 1.5 |
| **Course Type:** | Laboratory | **Lecture-Tutorial-Practical:** | 0-0-3 |
| **Pre-requisite:** | Basics of control systems  , Electrical Machines & MATLAB software. | **Sessional Evaluation: External Exam Evaluation:**  **Total Marks:** | 30  70  100 |

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| **Course Objectives:** | Students undergoing this course are expected to learn : | | |
| 1. To use feedback control system to determine transfer function of DC servo motor and any other given circuit with R, L and C components. 2. To model the systems and able to design the controllers and compensators. 3. The effect of poles and zeros location on transient and steady state behavior of second order systems and implement through software tools. 4. To determine the performance and time domain specifications of first and second order systems. 5. About the stability analysis. | | |
| **Course Outcomes:** | After completing the course the student will be able to | | Blooms  level |
| CO1 | Understand how to use feedback control system to determine transfer function of DC servo motor and any  other given circuit with R, L and C components | **L2** |
| CO2 | Model the systems and able to design the controllers and  compensators. | **L3** |
| CO3 | Get the knowledge about the effect of poles and zeros  location on transient and steady state behavior of second order systems and implement through software tools | **L4** |
| CO4 | Determine the performance and time domain specifications  of first and second order systems. | **L4** |
| CO5 | Understand the stability analysis | **L2** |
| **Course Content:** | Minimum of 10 experiments to be conducted out of the following:  **List of Experiments**   1. Time response of Second order system 2. Characteristics of Synchros 3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor. 4. Effect of feedback on DC servo motor 5. Transfer function of DC Machine 6. Effect of P, PD, PI, PID Controller on a second order system 7. Lag and lead compensation – Magnitude and phase plot 8. Temperature controller using PID 9. Characteristics of magnetic amplifiers 10. Characteristics of AC servo motor 11. Linear system analysis (Time domain analysis, Error analysis) using MATLAB. 12. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB   13.State space model for classical transfer function using  MATLAB – Verification. | | |