# LESSON PLAN

| **Discipline:** Elect. Engg. | **Semester:** Sixth($6^{th}$) | **Name of the Faculty:** Er S S Dash |
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| **Subject:** Control System Engineering | **No. of days per Week class allotted: S**ix (6) | **Semester from Date:** 14.02.23 **to Date:** 23.05.23<br><br>**No. of Weeks:** 15 |
| **WEEK** | **CLASS DAY** | **THEORY TOPICS** |
| $1^{st}$ | $1^{st}$ | Chapter No.- 01 (**fundamental of control system)**<br>Classification of control system |
| | $2^{nd}$ | Open loop system and closed loop system and its comparison. |
| | $3^{rd}$ | Effects of feedback. |
| | $4^{th}$ | Standard test signal (step, ramp, parabolic, impulse function) |
| | $5^{th}$ | Servomechanism. |
| | $6^{th}$ | **Possible question answer discussion** |
| $2^{nd}$ | $1^{st}$ | **Chapter no.-02(mathematical model of a system)**<br>Transfer function and impulse response |
| | $2^{nd}$ | Properties, advantages, & Disadvantages of transfer function |
| | $3^{rd}$ | Poles and zeroes of transfer function |
| | $4^{th}$ | Simple problems of transfer function of network |
| | $5^{th}$ | Mathematical modelling of Electrical Systems (R, L, C Analogous system) |
| | $6^{th}$ | **Possible question answer discussion** |
| $3^{rd}$ | $1^{st}$ | **Chapter no.-03 (control system components)**<br>Component of control system |
| | $2^{nd}$ | Gyroscope, Synchro's |
| | $3^{rd}$ | Tachometer, DC servomotor |
| | $4^{th}$ | AC Servomotor |
| | $5^{th}$ | **Possible question answer discussion** |

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| | 6th | **Chapter no.-04(block diagram algebra and signal flow graph)** Definition: Basic Elements of Block Diagram |
| 4th | 1st | **Monthly test-01** |
| | 2nd | Canonical Form of Closed Loop Systems |
| | 3rd | Rules for Block Diagram Reduction |
| | 4th | Procedure for reduction of Block Diagram |
| | 5th | Simple Problem for equivalent transfer function |
| | 6th | Basic Definition in signal Flow Graph and properties. |
| 5th | 1st | Construction of Signal flow graph from Block Diagram |
| | 2nd | Mason's Gain Formula |
| | 3rd | Simple problems in signal flow graph for network |
| | 4th | **Possible question answer discussion** |
| | 5th | **Chapter no.-05(time response analysis)** Ttime response of control system. |
| | 6th | Standard test signal. |
| 6th | 1st | Step signal. |
| | 2nd | Ramp signal. |
| | 3rd | Parabolic signal |
| | 4th | Impulse signal |
| | 5th | Time response of first order system with; |
| | 6th | Unit step response. |
| | 1st | Unit impulse response. |
| | 2nd | Time response of second order system to the unit step input. |

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| 7th | 3rd | Time response specification. |
| | 4th | Derivation of expression for rise time, peak time, peak overshoot. |
| | 5th | **Monthly test-02** |
| | 6th | Derivation of expression for settling time and -steady state error |
| 8th | 1st | Steady state error and error constants |
| | 2nd | Types of control system (steady state errors in type-0, type-1,type-2 system) |
| | 3rd | Effect of adding poles and zero to transfer function. |
| | 4th | Response with P, PI, PD, PID controller. |
| | 5th | **Possible question answer discussion** |
| | 6th | Chapter no-6<br>**(Analysis of stability by root locus technique)**<br>Root locus concept. Construction of root loci. |
| 9th | 1st | Rules for construction of the root locus. |
| | 2nd | Effect of adding poles to G(s) and H(s). |
| | 3rd | Effect of adding zeros to G(s) and H(s). |
| | 4th | **Possible question answer discussion** |
| | 5th | Chapter no-7**(Frequency Response Analysis**)<br>Correlation between time response and frequency response. |
| | 6th | Polar plots. |
| 10th | 1st | Bode plots |
| | 2nd | All pass and minimum phase system. |
| | 3rd | Computation of Gain margin. |
| | 4th | **Monthly test-03** |

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| | 5th | Computation of phase margin. |
| | 6th | Log magnitude versus phase plot. |
| 11th | 1st | Closed loop frequency response. |
| | 2nd | **Possible question answer discussion** |
| | 3rd | Chapter no-08 (**Nyquist plot**)<br>Principle of argument.<br>Nyquist stability criterion. |
| | 4th | Nyquist stability criterion applied to inverse polar plot. |
| | 5th | . Effect of addition of poles to G(S) H(S) on the shape of Nyquist plot |
| | 6th | Effect of addition of zeros to G(S) H(S) on the shape of Nyquist plot |
| 12th | 1st | Effect of addition of Poles &zeros to G(S) H(S) on the shape of Nyquist plot |
| | 2nd | Assessment of relative stability. |
| | 3rd | Constant M & N Circle |
| | 4th | Nicholas chart. |
| | 5th | **Possible question answer discussion** |
| | 6th | Revision |
| 13th | 1st | Revision |
| | 2nd | Revision |
| | 3rd | **Monthly test-04** |
| | 4th | Revision |
| | 5th | Revision |
| | 6th | Revision |
| 14th | 1st | Revision |

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| | 5th | Revision |
| | 6th | Revision |
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| | 2nd | Revision |
| | 3rd | Revision |
| | 4th | Revision |
| | 5th | Revision |
| | 6th | Revision |

Syllabus Coverage up to Internal assessment- Ch-1,2,3,4 &5.