

# PADMASHREE KRUTARTHA ACHARYA INSTITUTE OF ENGINEERING & TECHNOLOGY, BARGARH



## LESSON PLAN Session-2022-2023

Discipline: Electrical Engg. Semester: 6th

Name of the Teaching Faculty: Subhasis Nanda

Sub:- Control System Engg.

Subject: Control System Engg. No. of Days/per week class allotted 05

Semester From Date : 14/02/2023 To Date : 23/05/2023 No. of Weeks : 15

| Week | Class Day | Theory /Practical Topics                                   |
|------|-----------|------------------------------------------------------------|
| 1    | 1         | Introduction to control system.                            |
|      | 2         | Classification of control system.                          |
|      | 3         | open loop control system.                                  |
|      | 4         | Closed loop control system.                                |
| 2    | 5         | Effect of Feed back                                        |
| 2    | 6         | standard Test signals.                                     |
|      | 7         | Servo mechanism.                                           |
|      | 8         | Transfer function                                          |
|      | 9         | Impulse Response.                                          |
|      | 10        | Poles & Zeros of transfer function                         |
| 3    | 11        | Problem Practice of transfer function of a simple network. |
|      | 12        | Problem Practice.                                          |

S. S. S.  
Signature of the Faculty

Subject: Control System Engg. No. of Days/per week class allotted 05

Semester From Date : 14/02/2023 To Date : 23/05/2023 No. of Weeks : 15

| Week | Class Day | Theory /Practical Topics                              |
|------|-----------|-------------------------------------------------------|
|      | 13        | Mathematical Modelling of Electrical system of R,L,C. |
|      | 14        | Analogous system.                                     |
|      | 15        | Problem Practice.                                     |
| 4    | 16        | Components of Control system.                         |
|      | 17        | DC servomotors.                                       |
|      | 18        | Ac servomotors.                                       |
|      | 19        | Tachometers                                           |
|      | 20        | Synchos                                               |
| 5    | 21        | Gynoscope.                                            |
|      | 22        | Block Diagram Algebra.<br>Elements of Block Diagram.  |
|      | 23        | Basic block diagram of a closed loop system.          |
|      | 24        | Rules of Block Diagram Reduction.                     |

  
Signature of the Faculty

Subject: Control system Syst. No. of Days/per week class allotted 05  
 Semester From Date: 14/02/2023 To Date: 13/05/2023 No. of Weeks: 15

| Week | Class Day | Theory /Practical Topics                                  |
|------|-----------|-----------------------------------------------------------|
|      | 25        | Finding of transfer function of a block diagram.          |
| 6    | 26        | Problem Practise                                          |
|      | 27        | Problem Practise.                                         |
|      | 28        | Signal Flow Graph:<br>Definition, Properties, Elements.   |
|      | 29        | Finding SFG from Block Diagram.                           |
|      | 30        | Finding SFG from equation/<br>equilibrium equation.       |
| 7    | 31        | Problem Practise                                          |
|      | 32        | Mason's Gain Formula,                                     |
|      | 33        | Problem Practise                                          |
|      | 34        | Problem Practise.                                         |
|      | 35        | Time Response Analysis:<br>T.R of Control System.         |
| 8    | 36        | Standard test signal step, Ramp,<br>Parabola,<br>Impulse. |

S. K. S. S.  
 Signature of the Faculty

Subject: Control system Engg No. of Days/per week class allotted 05

Semester From Date : 14/02/2023 To Date : 23/05/2023 No. of Weeks : 15

| Week | Class Day | Theory /Practical Topics                                                            |
|------|-----------|-------------------------------------------------------------------------------------|
|      | 37        | T.R of First Order Control system.                                                  |
|      | 38        | Subjected to Unit step Response.                                                    |
|      | 39        | Subjected to Unit Impulse Response.                                                 |
|      | 40        | T.R. of Second order Control system.<br>subjected to Unit step input                |
|      | 41        | Time Response specification.<br>Definition of $t_r$ , $t_p$ , $M_p$ , $t_s$ , $t_d$ |
|      | 42        | Derivation of $t_r$ , $t_p$ , $M_p$ , $t_s$ , $e_{ss}$ .                            |
|      | 43        | Derivation of $M_p$ , $t_s$ .                                                       |
|      | 44        | Problem Practice 1st order.                                                         |
|      | 45        | Problem Practice 2nd order                                                          |
|      | 46        | Problem Practice specification.                                                     |
|      | 47        | Steady state error<br>definition, formula.                                          |
|      | 48        | Steady state error Constant.                                                        |

  
Signature of the Faculty



Subject: Control System Engg No. of Days/per week class allotted 05  
 Semester From Date: 14/02/2023 To Date: 23/05/2023 No. of Weeks: 15

| Week | Class Day | Theory / Practical Topics                                                                     |
|------|-----------|-----------------------------------------------------------------------------------------------|
|      | 49        | Steady state error for type 0, type 1, type 2 & higher order sys.                             |
|      | 50        | Effect of adding Poles and zeros to transfer function                                         |
|      | 51        | Response with P, PI Controller.                                                               |
|      | 52        | PD & PID Controller.                                                                          |
|      | 53        | Problem Practice.                                                                             |
|      | 54        | Stability Analysis:<br>Stability, stable system with respect to position of roots of char eq. |
|      | 55        | Routh Hurwitz Criterion.<br>Routh array                                                       |
|      | 56        | Problem Practice.                                                                             |
|      | 57        | Root locus Concept.                                                                           |
|      | 58        | Rules of Construction of Root locus.<br>Properties.                                           |
|      | 59        | Finding different values.                                                                     |
|      | 60        | Drawing of values to a graph.                                                                 |

S. S. S.

Signature of the Faculty

Subject: Control System Engg No. of Days/per week class allotted 05  
 Semester From Date : 14/05/2023 To Date : 23/05/2023 No. of Weeks : 15

| Week | Class Day | Theory / Practical Topics                                     |
|------|-----------|---------------------------------------------------------------|
|      | 61        | Problem Praetree : Root locus.                                |
|      | 62        | Frequency Response analysis.<br>Correlation with time Respon. |
|      | 63        | Polar Plots.                                                  |
|      | 64        | Problem Praetree.                                             |
|      | 65        | Bode plot, Magnitude Plot<br>Phase Plot.                      |
|      | 66        | Problem Praetree.                                             |
|      | 67        | Gain Margin & Phase Margin<br>from Bode Plot.                 |
|      | 68        | Drawing of Bode Plot to a<br>Bode Graph.                      |
|      | 69        | Principle of Argument, Nyquist<br>stability criterion.        |
|      | 70        | Nyquist Plot.                                                 |
|      | 71        | Problem Praetree.                                             |
|      | 72        | Effect of adding poles & zeros.                               |

S. S. S. S.  
 Signature of the Faculty

Subject: Control System Engg No. of Days/per week class allotted 05

Semester From Date : 01/4/2023 To Date : 23/05/2023 No. of Weeks : 15

| Week | Class Day | Theory /Practical Topics |
|------|-----------|--------------------------|
|      | 73        | Constant M crete         |
|      | 74        | Constant N crete         |
|      | 75        | Nicholas chart -         |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |
|      |           |                          |

  
Signature of the Faculty