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| LESSON PLAN |
| JHARSUGUDA ENGINEERING SCHOOL,JHARSUGUDA |
| Name of the Faculty: JYOTI RANJAN NAYAK | Academic Year: 2023-24 |
| Course No.: Th. 3 | Course Name: **CONTROL SYSTEM** |
| Programe: Diploma | Branch: Electrical Engineering  |
| Year/Sem: 6TH Sem  | Section: E1 |

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| **Week No.** | **Period** | **Time****(min)** | **Unit/****Chapter** | **Topic to be Covered** | **Teaching Method** |
| 1st | 1. | 55 | 1 | Classification of Control system | Chalk & Board |
| 2. | 55 | 1 | Classification of Control system | Chalk & Board |
| 3. | 55 | 1 |  Open loop system  | Chalk & Board |
| 4. | 55 | 1 | Closed loop system | Chalk & Board |
| 5. | 55 | 1 |  comparision | Chalk & Board |
| 2nd | 6. | 55 | 1 |  Effects of Feed back | Chalk & Board |
| 7. | 55 | 1 | Standard test Signals(Step, Ramp) | Chalk & Board |
| 8. | 55 | 1 |  Parabolic, Impulse Functions | Chalk & Board |
| 9. | 55 | 1 | Revision | Chalk & Board |
| 10. | 55 | 1 | Servomechanism | Chalk & Board |
| 3rd | 11. | 55 | 1 | Servomechanism | Chalk & Board |
| 12. | 55 | 2 | Transfer Function | Chalk & Board |
| 13. | 55 | 2 | Impulse response | Chalk & Board |
| 14. | 55 | 2 | Properties of Transfer Function | Chalk & Board |
| 15. | 55 | 2 | Advantages of Transfer Function | Chalk & Board |
| 4th | 16. | 55 | 2 | Disadvantage of transfer function | Chalk & Board |
| 17. | 55 | 2 | Poles & Zeroes of transfer Function | Chalk & Board |
| 18. | 55 | 2 | Poles & Zeroes of transfer Function | Chalk & Board |
| 19. | 55 | 2 | Simple problems of transfer function of network. | Chalk & Board |
| 20. | 55 | 2 | Simple problems of transfer function of network. | Chalk & Board |
| 5th | 21. | 55 | 2 | Mathematical modeling of Electrical Systems(R, L, C, Analogous systems) | Chalk & Board |
| 22. | 55 | 2 | Mathematical modeling of Electrical Systems(R, L, C, Analogous systems) | Chalk & Board |
| 23. | 55 | 3 | Components of Control System | Chalk & Board |
| 24. | 55 | 3 | Components of Control System | Chalk & Board |
| 25. | 55 | 3 | Gyroscope, Synchros, Tachometer  | Chalk & Board |
| 6th | 26. | 55 | 3 | DC servomotors | Chalk & Board |
| 27. | 55 | 3 |  Ac Servomotors | Chalk & Board |
| 28. | 55 | 4 | Definition: Basic Elements of Block Diagram | Chalk & Board |
| 29. | 55 | 4 | Canonical Form of Closed loop Systems | Chalk & Board |
| 30. | 55 | 4 | Canonical Form of Closed loop Systems | Chalk & Board |

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| 7th | 31. | 55 | 4 | Rules for Block diagram reduction | Chalk & Board |
| 32. | 55 | 4 | Procedure for of Reduction of Block Diagram | Chalk & Board |
| 33. | 55 | 4 | Simple Problem for equivalent transfer function | Chalk & Board |
| 34. | 55 | 4 | Simple Problem for equivalent transfer function | Chalk & Board |
| 35. | 55 | 4 | Basic Definition in Signal Flow Graph & properties | Chalk & Board |
| 8th | 36. | 55 | 4 | Construction of Signal Flow graph from Block diagram | Chalk & Board |
| 37. | 55 | 4 | Mason‘s Gain formula | Audio –Visual using SmartClass |
| 38. | 55 | 4 | Simple problems in Signal flow graph for network | Chalk & Board |
| 39. | 55 | 4 | Simple problems in Signal flow graph for network | Chalk & Board |
| 40. | 55 | 5 | Time response of control system | Chalk & Board |
| 9th | 41. | 55 | 5 | Standard Test signal , Step signal, Ramp Signal | Chalk & Board |
| 42. | 55 | 5 | Parabolic Signal , Impulse Signal | Chalk & Board |
| 43. | 55 | 5 | Time Response of first order system with:  Unit step response  | Chalk & Board |
| 44. | 55 | 5 | Unit impulse response. | Chalk & Board |
| 45. | 55 | 5 | Time response of second order system to the unit step input.  Time response specification | Chalk & Board |
| 10th | 46. | 55 | 5 | Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error. | Chalk & Board |
| 47. | 55 | 5 | Steady state error and error constants | Chalk & Board |
| 48. | 55 | 5 | Types of control system.[ Steady state errors in Type-0, Type-1 | Chalk & Board |
| 49. | 55 | 5 | Type-2 system | Chalk & Board |
| 50. | 55 | 5 | Effect of adding poles and zero to transfer function | Chalk & Board |
| 11th | 51. | 55 | 5 | Response with P, PI | Audio –Visual using SmartClass |
| 52. | 55 | 5 | Response with PD, PId | Audio –Visual using SmartClass |
| 53. | 55 | 6 | Root locus concept | Chalk & Board |
| 54. | 55 | 6 | Construction of root loci. | Chalk & Board |
| 55. | 55 | 6 | Rules for construction of the root locus | Chalk & Board |
| 12th | 56. | 55 | 6 | Effect of adding poles and zeros to G(s) and H(s). | Chalk & Board |
| 57. | 55 | 7 |  Correlation between time response and frequency response.. | Chalk & Board |
| 58. | 55 | 7 |  Polar plots.  | Chalk & Board |
| 59. | 55 | 7 |  Bode plots.  | Chalk & Board |
| 60. | 55 | 7 | All pass and minimum phase system | Chalk & Board |
| 13th | 61 | 55 | 8 | Principle of argument. |  |
| 62 | 55 | 8 | Nyquist stability criterion | Chalk & Board |
| 63 | 55 | 8 | Nyquist stability criterion | Chalk & Board |
| 64 | 55 | 8 | Niquist stability criterion applied to inverse polar plot | Chalk & Board |
| 65 | 55 | 8 | Niquist stability criterion applied to inverse polar plot | Chalk & Board |
| 14th | 66 | 55 | 8 | Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot. | Chalk & Board |
| 67 | 55 | 8 | Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot. | Chalk & Board |
| 68 | 55 | 8 | Assessment of relative stability | Chalk & Board |
| 69 | 55 | 8 | Assessment of relative stability | Chalk & Board |
| 70 | 55 | 8 | Constant M and N circle | Chalk & Board |
| 15th | 71 | 55 | 8 | Constant M and N circle | Chalk & Board |
| 72 | 55 | 8 | Nicholas chart. | Chalk & Board |
| 73 | 55 | 8 | Nicholas chart. | Chalk & Board |
| 74 | 55 |  | Revision | Chalk & Board |
| 75 | 55 |  | revision | Chalk & Board |

Learning Resources:

 Sl.No Title of the Book Name of Authors Name of Publisher 1. Control System A. Ananda Kumar PHI Control System K. Padmanavan IK 2. Control system Engineering I. J. Nagarath, M. Gopal WEN A Natrajan,Ramesh Babu 3. Control Systems D N Manik Cengage 6. S P Eugene Xavier, J Joseph