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| L No. | Topic to be discussed | Objective of lecture | Outcome of Lecture | Book referred | From Page to |
| 1 | **UNIT-1 Introduction:** Elements of control systems, concept of open loop and closed loop systems | we describe a general process for designing a control system. | basics concept of control system | B.S. Manke | 1-3 |
| 2 | Examples and application of open loop systems and closed loop system | Study of open and closed loop control system | Understanding the structures, basic components and terminology of control systems | B.S. Manke | 7-11 |
| 3 | brief idea of multivariable control systems. | to study the fundamental concept of control system | Defining controller structure with respect to controlled process | Hasan saeed | 35-39 |
| 4 | Representation of physical system (Electro Mechanical) by differential equations | To teach students how the mathematical modeling of dynamic system helps to design control system | Acquire the skills in deriving mathematical models of mechanical systems and its analysis | B.S. Manke | 74-80 |
| 5 | Determination of transfer function by block diagram reduction techniques | basics concept of transfer function | Describe feedback control in control systems. | B.S. Manke | 25-30 |
| 6 | Determination of transfer function by signal flow method | reduce the block diagram of a system to a single block for analysis | Understand the methods of representation of systems and to design their transfer function method | B.S. Manke | 59-61 |
| 7 | Laplace transformation function, | solve a system by laplace tranform | To use laplace transform to solve differential equations | B.S. Manke | 3-5 |
| 8 | inverse Laplace transformation | solve differential equations with given intial condition | To convert time domain signal to laplace | B.S. Manke | 5-7 |
| 9 | **UNIT-2 Time Response Analysis of First Order and Second Order System:** Characteristic equations | study first order and second order system | analyze and characterize the time response of first order and second order system | B.S. Manke | 120-122,198 |
| 10 | response to step inputs. | study of step input function | to analize step function with different amplitude | B.S. Manke | 123-124 |
| 11 | response to ramp inputs. | study of ramp input function | to analize ramp function with different amplitude | B.S. Manke | 125-126 |
| 12 | response to parabolic inputs. | study of parabolic input function | to analize parabolic function with different amplitude | B.S. Manke | 127-129 |
| 13 | Transient response analysis | analyze transient response | tostudy any event that affects the equilibrium of the system. | B.S. Manke | 130-135 |
| 14 | steady state errors | To investigate the elimination of steady-state error through the use of integral(I), and proportional plus integral(PI) control. | analyze time response of systems and steady state error analysis | B.S. Manke | 143-146 |
| 15 | steady state error constants, | study of steady state constant | analyze the error constant | B.S. Manke | 147-149 |
| 16 | Transient & steady state analysis of LTI systems | study transient and steady state system | Find the response of an *LTI system* in state space to *transient* responses of the *system* | Hasan Saeed | 203-207 |
| 17 | **UNIT-3 Control System Components:** Constructional of ac servomotor | study of ac seromotor | to analize voltage series analogy | Hasan Saeed | 245-248 |
| 18 | working concept of ac servomotor | study of principal of servomotor | to analize current series analogy of seromotor | Hasan Saeed | 249-251 |
| 19 | synchronous motor | study of ac synchronous motor | application of synchronous motor in different field | Hasan Saeed | 254-259 |
| 20 | stepper motor | study of stepper motor | application of stepper motor in different field | Hasan Saeed | 263-269 |
| 21 | **Stability and Algebraic Criteria**: concept of stability and necessary conditions, | Study of stability criteria | Analysis of stability | B.S. Manke | 198-199 |
| 22 | Routh-Hurwitz criteria and limitations. | Study of Routh-Hurwitz criteria and solve determine stability of a system | Analysis of Routh Hurwitz criteria | B.S. Manke | 201-202 |
| 23 | Root Locus Technique: The root locus concepts | Study of rot locus Technique | Analysis of stability by root locus | B.S. Manke | 290-300 |
| 24 | construction of root loci | Determine root loci | Analysis of root locus and comparison | B.S. Manke | 301-320 |
| 25 | **UNIT-4 Frequency Response Analysis:** Frequency response | Introduction of frequency response | Analysis of response | B.S. Manke | 287 |
| 26 | correlation between time and frequency responses | Determine relation between time and frequency response | Analysis both respose | B.S. Manke | 287 |
| 27 | polar plots | Study about Polar plots | Difference between polar plot and root locus | B.S. Manke | 223 |
| 28 | inverse polar plots | Study of inverse polar plot and determine plot of different-2 system | Analysis inverse polar plot | B.S. Manke | 224 |
| 29 | Bode plots | Study of Bode plot and determine bode plot | Analysis bode plot and differentiate to polar plot | B.S. Manke | 262-280 |
| 30 | Stability in Frequency Domain: Nyquist stability criterion, | Determine stability in frequency domain | Analysis Nyquist criterion | B.S. Manke | 208-224 |
| 31 | assessment of relative stability: gain margin and phase margin | Study of relative stability and determine gain margin and phase margin | Analysis gain and phase margin | B.S. Manke | 220-222 |
| 32 | M and N Loci,Nichols chart | Study M and N loci and study Nichols chart | Design M and N loci | B.S. Manke | 225-226 |
| 33 | **UNIT-5 The design problem and preliminary considerations lead network** | Introduction about network and determine phase angle | Analysis phase lead, lag network | B.S. Manke | 331-332 |
| 34 | The design problem and preliminary considerations lag network | Design of phase lag network | Analysis of phase lag network | B.S. Manke | 333-334 |
| 35 | lead-lag networks | Design of lead-lag network | Analysis of phase lead and lead –lag network | B.S. Manke | 334-335 |
| 36 | design of closed loop systems using compensation techniques in time domain . | Study of compensation technique and design closed loop system | Analysis closed loop system | Hasan Saeed | 303-306 |
| 37 | design of closed loop systems using compensation techniques in frequency domain. | Design closed loop system in frequency domain | Analysis system in frequency domain | Hasan Saeed | 309-315 |
| 38 | Brief idea of proportional controler | Explanation about controller and Study of Proportional controller | Analysis of proportional controller | Hasan Saeed | 317-319 |
| 39 | derivative controllers | Study of derivative controller | Analysis of derivative controller | Hasan Saeed | 320-322 |
| 40 | integral controllers | Study of integral controller determine a system having proportional, derivative, integral controller. | Analysis of integral controller | Hasan Saeed | 323-324 |

Also arrange the study material as per the plan above, includes last five year Q paper of University and questions from GATE