Subject Code : NN414

CONTROL SYSTEMS

Unit I: CONTROL SYSTEM AND FEEDBACK CHARACTERISTICS

Open Loop-closed loop system of feedback on gain stability, Sensitivity and noise transfer functions-Block diagram-Block reduction-signal flow graphs –Mason' s gain formula-sensitivity control system to parameter variations-control of disturbance signal in feedback systems-simple problems.

Unit II: TIME DOMAIN PERFORMANCE

Zero order, first order and second order systems-step and ramp response – steady state error –stability of linear time invariant system-necessary conditions for stability-Hurwitz stability –Routh's stability criterion-special cases-simple problems.

Unit III: CLOSED LOOP INDUSTRIAL SYSTEMS

Thermistors control of quench oil temperature-proportional mode pressure control system –Strip tension controller-Edge guide controls for strip recoiler-Automatic weighing system-Carbon dioxide controllers for Carbonizing furnace.

Unit IV: STATE SPACE ANALYSIS OF CONTROL SYSTEM

Introduction to state space representation of systems-solving the time invariant state equations-Solutions for homogeneous state equations-Laplace transform approach to the solution of non-homogeneous state equation-State transition matrix –Solutions of non-homogeneous state equations-Laplace transform approach to the solution of non-homogeneous state equation.

Unit V: DESIGN OF CONTROL SYSTEMS BY STATE SPACE METHODS

Controllability-Complete state controllability of continuous time system – Alternate form of the condition for complete controllability –O/P controllability-Observability-Complete abservability of continuous time system –Alternate form of the condition for complete abservability-Relationship between controllability , observability and transfer function – model reference control systems –Adaptive control systems.

TEXT BOOKS:

1. Automatic control Systems- S.N. VERMA
2. Automatic control systems - BENJAMIN C.KUO
3. Control system engineering – J. NAGARATH and M. GOPAL
4. Industrial Solid state Electronics, Devices and Circuits TIMOTHY J. MALVINO
5. Modern control Engineering- OGATA – Third Edition