

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Instrumentation)
Semester: I
Syllabus with Effect from: June - 2010

Paper Code: PS01CINS03	Total Credit: 4
Title Of Paper: Principles of Control Systems	

Unit	Description in detail	Weightage (%)
I	Control System: Components, Applications, Open Loop & Closed Loops, Effect of Feedback on: Overall Gain, Stability, Sensitivity & External Disturbance / Noise, Linear – Nonlinear Systems, Time Varying & Time Invariant Systems, Concept of Transfer Function, Impulse Response, Block Diagram of Control Systems, Rules for Block Diagram Reduction & Examples, Analysis of Multiple Input-Output Systems	25%
II	Signal Flow Graphs: Properties, Methods, Mason's Gain Formula & Application of Gain Formula between Output Nodes & Non-Input Nodes, Laplace Transforms: Definition, Inverse Laplace, Important Theorems & Partial Fraction Expansion, Examples, Equations of Electric Networks, Modeling of Mechanical System Elements & Equations, Sensors & Encoders in Control Systems, DC Motors in Control Systems	25%
III	Classification of Time Response, Steady State Analysis, Derivation of Steady State Error, Analysis of Type 0, 1 & 2 Systems, Analysis of First & Second Order System, Derivation of Time Domain Specifications, Stability of Control Systems, Relative Stability, Hurwitz's Criterion, Routh's Criterion: Special Cases, Applications, Advantages & Limitations, Examples	25%
IV	Root Locus: Concept, Angle & Magnitude Condition, Rules for Construction & Inverse, General Steps to Solve Problems, Examples, Bode Plot: Standards Factors of $G(j\omega)$ $H(j\omega)$, Steps to Sketch, Frequency Response of: Bode Plot, Polar Plot & $M-\phi$ Plot, Nyquist: Stability Criterion & Theorem.	25%

Basic Text & Reference Books:-

- Principles of Control Systems, S. C. Goyal & U. A. Bakshi, Technical Publications.
- Automatic Control Systems, Benjamin C. Kuo, Prentice Hall of India Private Limited.
- Feedback Control Systems, S. D. Bhide, J. N. Shinde & S. Satyanarayan, Tech-Max Publications.
- Control Systems Engineering, I. J. Nagrath & M. Gopal, New Age International Publishers.
- Modern Control Engineering, Katsuhiko Ogata, Pearson Education Asia.
- Control Systems Principles and Design, M. Gopal, Tata McGraw-Hill Publishing Company Limited.

