RO8401 AUTOMATIC CONTROL SYSTEMS
DETAILED SYLLABUS

UNIT I INTRODUCTION

Open loop and closed loop systems - Examples - Elements of closed loop systems - Transfer function - Modeling of physical systems – Mechanical, Thermal, Hydraulic systems and Electric Networks - Transfer function of DC generator, DC servomotor, AC servomotor ,Potentiometer, Synchros, Tachogenerator, Stepper motor - Block diagram - reduction techniques, Signal flow graph – Mason" gain formula. (Related Tutorials Using MATLAB/ Simulink – Toolboxes & Functions)

UNIT II TIME DOMAIN ANALYSIS

Standard Test signals – Time response of second order system - Time domain specifications – Types of systems - Steady state error constants - Introduction to P, PI and PID modes of feed back control. (Related Tutorials Using MATLAB/ Simulink – Toolboxes & Functions)

UNIT III FREQUENCY DOMAIN ANALYSIS

Frequency domain specifications - Time and frequency response correlation – Polar plot – Bode plot – All pass minimum phase and non-minimum phase systems. (Related Tutorials Using MATLAB/ Simulink – Toolboxes & Functions)

UNIT IV SYSTEM STABILITY

Characteristic equation - Routh Hurwitz criterion of stability - Absolute and Relative stability – Nyquist stability - Nyquist stability criterion - Assessment of relative stability – Gain and Phase Margin. (Related Tutorials Using MATLAB/ Simulink – Toolboxes & Functions)

UNIT V ROOT LOCUS METHOD

Root locus concepts - Construction of root loci – Root contours. (Related Tutorials Using MATLAB/ Simulink – Toolboxes & Functions) STATE SPACE ANALYSIS: Limitations of conventional control theory - Concepts of state, state variables and state model – state model for linear time invariant systems - Introduction to state space representation using physical - Phase and canonical variables. (Related Tutorials Using MATLAB/ Simulink – Toolboxes & Functions)

OBJECTIVES:

To study the basics of control system and its response .stability of mechanical and electrical systems . Use of MATLAB to design a stable control system.

To introduce the elements of control system and their modeling using various Techniques.

To introduce methods for analyzing the time response.

To impart knowledge about the frequency response and the stability of systems

To introduce the state variable analysis method

TEXT BOOKS:

1. Nagrath I J, and Gopal, M, 'Control Systems Engineering" Prentice Hall of India, New Delhi, 2008.

2. Richard C Dorf and Robert H Bishop, "Modern Control Systems.", Addison-Wesley -2007

REFERENCES:

1. Ogata K, "Modern Control Engineering", Pearson Education, New Delhi, 2006.

2. Kuo B C, "Automatic Control Systems", Prentice-Hall of India Pvt. Ltd, New Delhi, 2004.

3. Norman C. Nise S, "Control system Engineering", John Wiley & Sons, Singapore, 2004.