	NATIONAL INSTITUTE OF TECHNOLOGY, WARANGAL DEPARTMENT OF CHEMICAL ENGINEERING IV B.Tech (Chemical Engineering) I Semester			
CH401	**PROCESS DYNAMICS AND CONTROL**	**PCC**	**3 – 1 – 0**	**4 Credits**

Detailed Syllabus:

Response of First order systems: Transfer Function, Transient Response, Forcing Functions and Responses. Physical examples of First and Second order systems: Examples of First order systems, Linearization, Transportation Lag.

Components of a Control System, Block Diagram, Development of Block Diagram, Controllers and Final Control Elements. Closed loop Transfer functions: Standard Block-Diagram Symbols, Transfer Functions for Single-Loop Systems and Multi-loop Systems.

Transient response of simple control systems: Servo Problem, Regulatory Problem, Controllers: Proportional, Proportional-Integral, PID Controllers. Ziegler-Nichols Controller Settings. Stability: Routh Test for Stability, Root Locus.

Introduction to frequency Response: Substitution Rule, Bode Diagrams. Control system design based on frequency response: Bode and Nyquist Stability Criterion, Gain and Phase Margins.

Advanced Control Strategies: Cascade Control, Feed-forward Control, Ratio Control, Dead-Time Compensation (Smith Predictor), Internal Model Control. Controller tuning and process identification. Control Valves: Control Valve Construction, Valve Sizing, Valve Characteristics, Valve Positioner.

Scheme of Evaluation:

Minor-I/Assignment/Surprise Tests	: 10 Marks
Minor-II//Assignment/Surprise Tests	: 10 Marks
Mid Semester Examination	: 30 Marks
End Semester Examination	: 50 Marks

Reading:

1. Coughanowr D.R., Process System analysis and Control, 2nd Edition, McGraw Hill International Edition, 2011.
2. Seborg D.E., Edgar T. E and Millichamp D.A, Process Dynamics and Control, John Wiley & Sons, 2004.
3. Stephanopolis G., Chemical Process Control, Prentice Hall India, 2008.
4. Bequette, B.W., Process Control: Modeling, Design and Simulation, 2007.