

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

B.E. THIRD YEAR

ELECTRONICS & COMMUNICATION

(In Force June 2006)

SEMESTER – VI

EC 606 [C] – DIGITAL CONTROL SYSTEM (Elective Paper – I)

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Theory Hrs.	Theory Marks	Pract./ Viva Marks	Term Work Marks	Total Marks
3	2	3	100	25	25	150

SYLLABUS

1. Introduction to Control System terminology, Computer Based control.
2. Signal Processing in Digital Control: Configuration, Principles of signal conversion, Basic discrete time signals, Time domain model, Transfer function model, Stability on Z plane, Principles of Discretization, Stability criterions.
3. Models of Digital control devices and Systems: Z domain description of Sampled continuous time plants, Z domain description of Systems with Dead time, Implementation of Digital Controllers, Digital control systems examples.
4. Design of Digital Control Algorithms: z plane specification of Control system design, Digital Compensator design using frequency response & Root Locus plots, Z place synthesis.
5. Pole Placement Design & State observers: Stability improvement by state feedback, Necessary and sufficient condition for arbitrary pole placement, State Regulator Design, Design of State Observers, Compensator design using separation principles, Servo Design, State feedback with integral control, Digital control system with state feedback.
6. Lyapunov Stability Analysis: Basic Concepts, Stability definitions & theorems, Lyapunov functions for Linear and Non-linear systems, A model reference adaptive system.
7. Linear Quadratic Optimal Control: Parameter Optimization & Optimal control problems, Quadratic performance index, Control configuration, State regulator design through Lyapunov equations, Optimal state regulator through Matrix Riccati equations, Optimal digital control system, Critique of Linear quadratic control.

REFERENCE BOOKS:

1. Digital Control and state variable methods by M.Gopal (TMH)
2. Analog & Digital Control system design by Chi Tsong Chen (Oxford Press)
3. Digital Control of Dynamic Systems – G.F Franklin, J. David Powell and Michael Workman, Pearson Education Asia