SEMESTER	DEPARTMENT	COURSE TITLE
Sixth	*Control Engineering*	*Control Theory II*
COURSE CODE	**HOURS:** 3	**COURSE SPECIFICATIONS**
EC606	**UNITS: 3**	*Theoretical Contents*

1. ***Review of Continuous Control :***
   - Continuous-time Models.
   - State Space Representation of Transfer Function Systems.
   - PI and PID Controllers.

2. ***Introduction to Digital Control.***
   - Discrete-Time Control Systems Vs Continuous-Time Control Systems.
   - Definition and Types of Sampling.
   - Quantization and Quantization Errors
   - Discrete-Systems Analysis: Linear Difference Equations, Discrete Transfer Function
   - Z – Transform.

3. ***Z-Plane Analysis of Discrete- Time Systems***
   - Characteristic equation.
   - Mapping the s-plane into the z-plane.
   - System Stability.
   - Steady State Error Analysis for Stable Systems.
   - Root Locus Analysis.
   - Bilinear transformation.
   - Routh-Hurwitz criterion.
   - Nyquist criterion
   - Bode diagrams.

4. *State-Space Analysis*

- State- Space Representations of Discrete Time Systems.
- Solving Discrete Time State Space Equations.
- Pulse Transfer Function Matrix.
- Discretization of Continuous –Time State-Space Equations.

5. *Analysis of Sampled Data Systems :*

- Stability.
- Sensitivity and Robustness.
- Controllability/Observability.
- Pole/Zero Cancellation.

6. *Digital Controller Design.*

- Specifications.
- Disturbance Rejection
- Compensation.
- Phase-lag, phase-lead, lag-lead compensation.
- Discrete PID Controllers.

References:

1. K. Ogata, “Discrete Time Control Systems, 2nd ed.”, Prentice Hall, 1995.
2. B.C. Kuo, “Digital Control Systems, 2nd ed.”, Oxford Univ. Press, 1992.
3. G.F. Franklin, J.D. Powell and M. Workman, "Digital Control of Dynamic Systems, 3rd ed." Addison-Wesley Publisher, 2006.