18EEP04	DISCRETE CONTROL SYSTEMS	L	T	P	C
		3	0	0	3

Course Objectives:

1.	To understand the digital signal processing.
2.	To study the design of sampled data control systems in state space.
3.	To impart knowledge on digital control algorithms and stability study.

Unit I	INTRODUCTION	9	+	0

Review of frequency and time response analysis and specifications of continuous time systems - need for controllers - continuous time compensations - continues time PI, PD, PID controllers, Realization of basic compensators: Lag, Lead and Lag-Lead compensation schemes - problems.

Unit II	SIGNAL PROCESSING IN DIGITAL CONTROL	9	+	0

Need for digital control – Configuration of basic digital control scheme – Principles of signal conversion – Basi discrete-time signals – Time domain and frequency domain models for discrete-time systems - Aliasing - Reconstruction of analog signals – Practical aspects of the choice of sampling rate – Discretization based o bilinear transformation.

Unit III	MODELING AND ANALYSIS OF SAMPLED DATA CONTROL SYSTEM	9	+	0

Differential equation description – Z-transform method of description– Z-transform analysis of sampled data control systems –Jury's stability test – Routh stability criterion on the r-plane – State variable concepts: First companion – Second companion – Jordan canonical models – Discrete state variable models – Elementary principles.

Unit IV	DESIGN OF DIGITAL CONTROL ALGORITHMS	9	+	0

Introduction – z-plane specifications of control system design –Digital lead , lag and lag-lead compensator desig using frequency response plots - Digital lead lag compensator design using Root locus plots – z-plane synthesi – Digital controllers for deadbeat performance - Examples.

Unit V	PRACTICAL ASPECTS OF DIGITAL CONTROL ALGORITHMS	9	+	0

Development and implementation of digital PID control algorithms – Tunable PID controllers - Digital temperature control system: Control algorithm – Digital position control system: Digital measurement of shaft position/speed, control algorithm – Stepping motors and their controls: Torque-speed curves, Interfacing of stepper motors to microprocessors

Total (45+0)= 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Get knowledge about digital control scheme.
CO2	:	Get knowledge about sampling techniques.
CO3	:	Design the various digital control algorithms.
CO4	:	Design the various types of digital controllers.
CO5	:	Design the various types of digital compensators.
CO6	:	Get knowledge about applications of digital control.

Text Books:

1.	M.Gopal, "Digital Control and Static Variable Methods", Tata McGraw Hill, New Delhi, 2003,2nd edition.
2.	I.J.Nagrath&M.Gopal, "Control Systems Engineering", New Age International Publishers, New Delhi, 2009,5th edition.

Reference Books:

1.	B.C.Kuo, Digital Control Systems,Oxford University Press,2nd Edition,2007.
2.	K. Ogata, Modern Control Engineering, Pearson Education, 2010 5th edition.

3.	Kenneth J. Ayala, "The 8051 Microcontroller- Architecture, Programming and Applications", Penram International, 2nd Edition, 1996.

E -References

1	https://nptel.ac.in/courses/108103008/
2	https://www.sciencedirect.com/topics/engineering/digital-control-system

CO/PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	1	2	1	1	1	1	
CO2	3	3	2	1	2	1	2	1	1	1	1	
CO3	3	3	3	3	2	1	3	1	1	1	1	
CO4	3	3	3	3	3	1	3	1	1	1	1	
CO5	2	3	3	3	3	1	3	1	1	1	1	
CO6	1	1	1	3	2	1	3	1	1	1	1	