DIFFERENCE EQUATIONS

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
IV	21CPM A4D	Elective IV	Hrs/week	Hrs/Sem	Hrs/week	Hrs/Sem	0	3
			6	90	6	90		

COURSE OBJECTIVES:

The students will be able to

- Understand the process of discretization, discrete version of Differential Equations, Discrete oscillation and the asymptotic behavior of solutions of certain class of difference equations/
- Find Solution of difference equations using z- transforms.

COURSE OUTCOMES:

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Investigate an important features of Linear Difference Equations of Higher Order and Limiting behavior of Solutions.	K2
CO2	Explain about autonomous system and Linear Periodic system.	K3
CO3	Examine the concept of Z transform and Volterra Systems.	K3
CO4	Discuss about Asymptotic behavior of difference equation for higher order.	K3
CO5	Apply the Concept of Oscillation Theory for Non-Linear Difference Equations.	K3

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze.

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	M	S	M
CO2	M	S	M	S	M	S
CO3	S	M	M	S	M	S
CO4	S	M	S	M	M	M
CO5	S	S	M	M	S	M

S- Strong; M – Medium; L – Low

UNIT –I: LINEAR DIFFERENCE EQUATIONS OF HIGHER ORDER 18 Hours

Difference Calculus –General Theory of Linear Difference equations –Linear Homogenous Equations with constant Coefficients –Linear Non –Homogenous Equations –Method of Undetermined Co–efficient - The method of variation of constants- Limiting behavior of solutions.

Chapter 2: Sections 2.1 to 2.5

UNIT –II: SYSTEM OFLINEAR DIFFERENCE EQUATIONS 18 Hours

Autonomous (Time Invariant) System –The Basic Theory –The Jordan form –Linear periodic system.

Chapter 3: Sections 3.1 to 3.4

UNIT –III: THE Z-TRANSFORM METHOD AND VOLTERRA DIFFERENCE EQUATIONS 18 Hours

Definition, Example and properties of Z-transform –the Inverse Z-Transform and solution of Difference Equations : Power series method, Partial fraction method, the inversion integral method –Volterra Difference Equation of convolution type : The Scalar Case – Explicit Criteria for Stability of Volterra Equations - Volterra systems.

Chapter 6: Sections 6.1 to 6.5

UNIT –IV: ASYMPTOTIC BEHAVIOUR OF DIFFERENCE EQUATION 18 Hours

Tools of Approximations –Poincare's Theorem -Asymptotically diagonal systems - High order Difference Equations - Second order difference equations .

Chapter 8: Sections 8.1 to 8.5.1

UNIT –V: OSCILLATION THEORY 18 Hours

Three –term difference Equations –Self –Adjoint second order equations- Non –Linear Difference Equations .

Chapter 7: Sections 7.1 to 7.3

DISTRIBUTION OF MARKS: THEORY 80% AND PROBLEMS 20%

TEXT BOOK

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Saber. N. Elaydi	An Introduction to Difference Equations	Springer Verlag, NewYork	1996

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	R.P.Agarwal	Difference Equations and Inequalities	Marcel Dekker	1999
2.	S. Goldberg	Introduction to Difference Equations	Dover Publications	1986
3.	V.LakshmiKantham and Trigiante,	Theory of Difference Equations	Academic Press, New York	1988
4.	Peterson	Difference Equation-An Introduction with Applications	Academic Press, New York	1991

WEBRESOURCES

1.https://www.researchgate.net/publication/245346142_An_Introduction_to_Difference_Equation

2.https://books.google.com/books/about/Introduction_to_Difference_Equations.html

TEACHING METHODOLOGY

1. Class room teaching
2. Giving Assignments for all units
3. Discussions
4. Home test
5. PPT presentation

SYLLABUS DESIGNER

Mrs.C.Revathi, Assistant Professor of Mathematics.