FUNCTIONAL ANALYSIS

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
IV	21CPMA4C	Core – Paper XV	Hrs/week	Hrs/Sem	Hrs/week	Hrs/Sem	0	5
			6	90	6	90		

COURSE OBJECTIVES:

The students will be able to

- Study Normed linear spaces, Banach spaces, Hilbert Spaces, and operators on these spaces.
- Develop their skills and confidence in mathematical analysis and proof techniques.

COURSE OUTCOMES:

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

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Understand Continuous linear transformations and the Hahn-Banach theorem	K2
CO2	Derive the Open Mapping Theorem and its applications.	K3
CO3	Obtain Orthogonal complements, Orthonormal sets and conjugate space.	K3
CO4	Understand the relevance of Operator Theory	K3
CO5	Discuss structure of communitative banach algebras	K4

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	S	S	M	M	S
CO4	S	M	M	M	M	M
CO5	S	S	S	S	S	M

S- Strong: M- Medium: L- Low

UNIT – I: BANACH SPACES **18 Hours**

Definition – Some examples – Continuous Linear Transformations – The Hahn Banach Theorem – the Natural embedding of N in N**

Chapter 9: Sections 46 to 49.

UNIT – II: BANACH SPACES AND HILBERT SPACES **18 Hours**

Open Mapping Theorem – Conjugate of an operator – Orthogonal complements.

Chapter 9: Sections 50 and 51.

Chapter 10: Sections 52 and 53

UNIT – III: HILBERT SPACES **18 Hours**

Conjugate space H* - Adjoint of an operator – Self –adjoint operator –Normal and Unitary operations.

Chapter 10: Sections 55, 56, 57 and 58.

UNIT – IV: PRELIMINARIES ON BANACH ALGEBRAS **18 Hours**

Definitions and some examples – Regular and elements – Topolgical divisors of Zeros.

Chapter 12: Sections 64 to 66 and 68.

UNIT – V: STRUCTURE OF COMMUNITATIVE BANACH ALGEBRAS **18 Hours**

Gelfand Mapping – Applications of the formula $r[x] = \lim|x|^{1/n}$- GelfandNeumark Theorem.

Chapter 13: Sections 70, 71 and 73.

DISTRIBUTION OF MARKS: THEORY 90% AND PROBLEMS 10%

TEXT BOOK:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	George F. Simmons	Introductions to Topology and Modern Analysis	McGraw Hill Book Company, New York.	1963

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	W.Rudin	Functional Analysis,	Prentice Hall of India	1975
2	G.Bauhman	Functional Analysis	Tata McGraw Hill Publishing Company	1973.
3	H.C.Goffman and G.Fedrick	First cause in FunctionalAnalysis	Prentice Hall of India	1987.

WEB RESOURCES

1. https://www.isibang.ac.in/ An Introduction to Basic Functional Analysis -notes.pdf
2. https://www.math,hkbu.edu.hk/ Functional Analysis-notes.pdf

TEACHING METHODOLOGY

1. Class room Teaching
2. Assignments
3. Seminars
4. Discussions
5. PPT Presentations

SYLLABUS DESIGNER

Ms. Y.Vishnupriya, Assistant Professor of Mathematics.