Semester I			
Elective I B	**Fuzzy Sets**		
Course Code :21PMAE12	**Hrs/week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Course Objectives

- To establish thorough knowledge on the basic mathematical elements of the theory of fuzzy sets.
- To provide an emphasis on differences and similarities between fuzzy sets and classical set theories.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	differentiate crisp sets and fuzzy sets.	6	An
CO-2	use the fuzzy set theory on statistical methods.	7	Ap
CO-3	compare statistical methods against fuzzy logic methods.	1,7	An
CO-4	apply fuzzy logic membership function.	2,6	Ap
CO-5	solve problems on fuzzy set theory.	2	Ap
CO-6	evaluate fuzzy statistics applications	2,7	Ev
CO-7	identify the methods of fuzzy sets and fuzzy logic in solving problems in the theory of fuzzy control.	1,7	Un
CO-8	explain the theory of statistics fuzzy logic	5	Un

Semester I			
Elective I B	**Fuzzy Sets**		
Course Code:21PMAE12	**Hrs/week:6**	**Hrs/Sem:90**	**Credits:4**

Unit-I

Basic types - Additional properties of α-cuts - representation of fuzzy sets - Extension principle for fuzzy sets.

(Chapter 1: Sections 1.3 & 1.4 Chapter 2: Sections 2.1 & 2.3)

Unit-II

Types of operations - fuzzy complements - fuzzy intersections: t-norms - fuzzy unions: t-conorms- combinations of operations - aggregation operations.

(Chapter 3: Sections 3.1-3.6)

Unit-III

Fuzzy numbers - linguistic variables - arithmetic operations on intervals - arithmetic operations on fuzzy numbers.

(Chapter 4: Sections 4.1- 4.4)

Unit-IV

Lattice of fuzzy numbers - fuzzy equations - crisp versus fuzzy relations - projections and cylindric extensions.

(Chapter 4: Sections 4.5 & 4.6 Chapter 5: Sections 5.1 & 5.2)

Unit-V

Binary fuzzy relations - binary relations on a single set - fuzzy equivalence relations- fuzzy compatibility relations - fuzzy ordering relations.

(Chapter 5: Sections 5.3 - 5.7)

Text Book:

1. George J. Klir and Bo Yuan. *Fuzzy sets and Fuzzy Logic Theory and Applications*. New Delhi: PHI Learning Private Limited, 2012.

Reference Books:

1. J.Zimmerman. *Fuzzy set Theory and its Applications*. New Delhi: Allied Publishers Ltd, 1991.
2. Bhargava A.K. *Fuzzy set Theory Fuzzy Logic and their Applications*. S. Chand and company, 2013.

Semester II			
Elective II B	**Applied Algebra**		
Course Code: 21PMAE22	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 3**

Course Objectives

- To acquire a thorough knowledge on Boolean Algebras, Switching circuits and linear codes.
- To provide with an overview of discrete mathematics and related disciplines.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand some fundamental mathematical concepts and terminology.	2,4	Un
CO-2	analyse recursive definitions.	2,6	An
CO-3	list some different types of discrete structure.	2	Re
CO-4	compare the different techniques for constructing mathematical proofs, illustrated by discrete mathematics examples	2	An
CO-5	solve linear codes and cyclic codes.	1,6	Ap
CO-6	understand the concepts of Boolean Algebra and lattices.	2	Un
CO-7	Apply basic and advanced principles of codes	2,6	Ap
CO-8	create logical proofs.	2	Cr

Semester II			
Elective II B	**Applied Algebra**		
Course Code: 21PMAE22	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 3**

Unit I

Properties and examples of Lattices- Distributive Lattices-Boolean Algebras- Boolean Polynomials – Minimal forms of Boolean Polynomials.

(Sections : 1,2,3,4&6 Problems: Section 1:7,11,14,15**, Section 2:** 2,5,6,13**, Section 3:**3,4,8**, Section 4:**8,9**& Section 6:** 3,6,7,8**)**

Unit II

Switching circuits- Applications of Switching circuits

(Sections 7&8 Problems: Section 7: 1, 2,4,5,6**& Section 8:** 3, 4, 5**)**

Unit III

Irreducible Polynomials over Finite fields- Factorization of Polynomials over Finite Fields.

(Sections 14&15 Problems : Section 14:2,4,5,7,8,12,16**& Section 15:**2,3,4,5,8,9**)**

Unit IV

Introduction to Coding- Linear Codes.

(Sections 16&17 Problems : Section 16:3,4,5,7,10**& Section 17:**1,2,4,5,8,10,11,14**)**

Unit V

Cyclic Codes- Special Cyclic Codes

(Sections 18&19 Problems : Section 18: 1,2,4,7,10,11,16,17**& Section 19:** 2,3,4,7,8**)**

Text Book

1. Rudolf Lidi and Gunter Pilz. *Applied Abstract Algebra*. Springer Publications. Second Edition.

Books for Reference

1. Arumugam .S& Isaac .A.T.*Modern Algebra*. Scitech Publications (INDIA) PVT.LTD, 2003.
2. Daniel Augot et al. *An introduction to linear and cyclic codes*, Journal of Symbolic Computional, 2009.