COURSE CODE	COURSE NAME	L	T	P	C
MA2013	Mathematical Foundations of Computer Science	3	0	0	3

PURPOSE

To impart analytical ability and to solve real life problems pertaining to branches of Computer Science and Engineering.

INSTRUCTIONAL OBJECTIVES

At the end of the course, Students should be able

- To be exposed with logic, normal forms and mathematical reasoning and to count/enumerate objects in a systematic way.
- To be thorough in mathematical induction, generating functions and recursive functions for calculating recurrence relations.
- To understand algebraic systems such as relations, functions and construct mathematical arguments.
- To be familiar with the basic concepts of lattices, posets and Boolean algebra.

Unit I: Logic **9**

Logic - Statements - Connectives - Truth tables - Normal forms - Predicate calculus - Inference Theory for Statement calculus and predicate calculus.

Unit II : Combinatory **9**

Combinatory - Mathematical Induction - Pigeonhole principle - Principle of inclusion and exclusion.

Unit III : Recurrence Relations **9**

Recursive Functions- Recurrence relation - Solution of recurrence relation using characteristic polynomial and using generating function - Recursive functions - Primitive recursive functions, Computable and non computable functions.

Unit IV : Groups **9**

Algebraic Structures - Groups - Definition and examples only - Cyclic groups - Permutation group (Sn and Dn) - Subgroups - Homomorphism and Isomorphism - Cosets - Lagrange's Theorem - Normal subgroups - Cayley's representation theorem.

Unit V : Boolean Algebra **9**

Lattices - Partial order relations, Poset - Lattices, Hasse diagram - Boolean algebra.

Total Hours = 45

REFERENCES:

1. Tremblay J.P. and Manohar R., "Discrete Mathematical Structures with applications to Computer Science", McGraw Hill International Edition, 1987Kenneth H. Rosen, Discrete Mathematics and Its Applications, 4th Edition, Tata McGraw Hill, 2002
2. Venkataraman M.K. etal., "Discrete Mathematics", National Publishing Co.,2000
3. Prof. V. Sundaresan, K.S. Ganapathy Subramanian and K. Ganesan, Discrete Mathematics, New Revised Edition, 2001
4. Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd.,1992
5. C.L. Liu, Elements of Discrete Mathematics, 2nd Edition, McGraw Hill Publications, 1985
6. Gersting. J.L. Mathematical Structures for Computer Science, 3rd Edition, W.H. Freeman and Co., 1993
7. Lidl and Pitz, Applied abstract Algebra, Springer - Verlag, New York, 1984