4.3.2 SYLLABI OF PROGRAM CORE COURSES : II SEMESTER

SEMESTER II B. TECH. COMPUTER SCIENCS & ENGINEERING (DATA SCIENCE)

Course Code	Type	Subject	L	T	P	Credits	CA	MS	ES	CA	ES	Pre-requisites
CDCSC01	CC	Discrete Structures	3	1	0	4	25	25	50	-	-	None

COURSE OUTCOMES

1. To be able to analyze and compute time and space complexity of various computing problems.
2. To be able to design algorithms for solving various problems using the concepts of discrete mathematics.
3. To apply the concepts and algorithms learnt in developing large scale applications and modify them.
4. Get a grasp of the practical problems and their relation with discrete structures.
5. Implement practical problems using the discrete structures approach.

COURSE CONTENT

UNIT-I

Logic: Mathematical Logic, Propositions, Truth Tables, and Logical inferences, Methods of Proof, Propositional Logic, Logical Inference, First order logic, applications, Predicates and quantifiers.

Set Theory, Relations and Functions: Elements of Set Theory, Primitives of set theory, binary Relation and its Representation, type of Binary Relations, Equivalence relations and partitions. Functions, Types of functions, Inverses and composition of Functions.

UNIT-II

Counting: Counting and analysis of algorithms, Principles of inclusion-exclusion, Pigeon hole principle, Permutations, Combinations.

Mathematical induction: proof by induction, Recursion, Characteristic Polynomial, Recurrence relation, generating functions, Asymptotic behavior of algorithms.

UNIT-III

Posets, Lattices and Group Theory: Posets, Hasse Diagram, Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice, Boolean Algebra, Groups & rings.

Number Theory: Infinity and Natural numbers, Integers, Divisibility and Euclidean algorithm, Prime numbers, Congruence, Modular arithmetic, Euler ϕfunction.

UNIT-IV

Graphs: Graph isomorphism, Paths and Cycles, Graph coloring, Critical

Path, Eulerian paths and circuits, Hamiltonian paths and circuits, Bipartite Graphs, Digraphs, Multigraphs.

UNIT-V

Probability: Overview of probability theory, Discrete distributions.

SUGGESTED READINGS

1. **Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH.**
2. **C.L. Liu, "Elements of Discrete Mathematics", TMH.**
3. **Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI.**
4. **NarsinghDeo, "Graph Theory With Application to Engineering and Computer Science",PHI.**
5. **Charles S. Grimmstead, J. Laurie Snell "Introduction to Probability". Kai Lai Chung, "A Course in probability theory".**
6. **J.P.Tremblay & R. Manohar, "Discrete Mathematical Structure with Applications to Computer Science" Mc.Graw Hill.**

Course Code	Type	Subject	L	T	P	Credits	CA	MS	ES	CA	ES	Pre-requisites
CDCSC02	CC	Data Structures	3	0	2	4	15	15	40	15	15	None

COURSE OUTCOMES

1. **Candidate will be able to choose the appropriate data structure for a specified problem and determine the same in different scenarios of real world problems.**
2. **Become familiar with writing recursive methods and reducing larger problems recursively in smaller problems with applications to practical problems.**
3. **Be able to understand the abstract properties of various data structures such as stacks, queues, lists, trees and graphs and apply the same to real life problems of sorting, searching, and traversals for skill enhancement in problem solving.**
4. **Be able to implement various data structures in more than one manner**
5. **Understand the advantages and disadvantages of the different implementations by using efficient representation of problems.**

COURSE CONTENT

UNIT-I

Introduction: Basic Terminology: Elementary Data Organization, Data Structure Operations, Algorithms Complexity and Time-Space Trade off. Arrays: Array Definition and Analysis, Representation of Linear Arrays in