

Discipline Specific Elective-2 :Semester –V

DSE-2 Data Structures and Algorithm Analysis using Java

BLOCK – I

Unit-1: Mathematics review, Recursion revisited, Generic Templates in C++, Algorithm Analysis-definition,model, running time calculations,

Unit-2: Lists-the list ADT, vector and list as Standard Template Library, implementation of vector, Implementation of List

Stacks- The stack ADT, stack model implementation of stacks, applications of stacks

Unit-3: Queues - The Queue ADT, Queue model implementation of Queues, applications of Queue.

BLOCK-II

Unit-4: Trees –preliminaries, binary trees, search tree ADT for Binary search tree, AVL Trees

Unit-5: Trees - Splay trees, tree traversals revisited, B-Trees, Sets and Maps in the Standard Library

Unit-6: Hashing - General idea, hash function, separate chaining, hash tables without linked lists, rehashing, hash tables in the standard library, hash tables with worst case O(1) access, universal hashing, extendible hashing

BLOCK-III

Unit-7: Priority Queues (heaps) - model, simple implementation, binary heaps, application of heaps, leftist heaps, skew heaps, Binomial queues, heaps in STL.

Unit-8: Sorting- Preliminaries, insertion sort, A lower bound for simple sorting algorithms, shell sort, heap sort, merge sort

Unit-9 : Sorting – quick sort, decision trees, lower bound for decision trees, adversary lower bound, linear-time sorts - bucket sort, radix sort, external sorting

BLOCK-IV

Unit-10 : Graph-Algorithms – definition, topological sort, shortest path algorithms, network flow problems,

Unit-11:, Graph-Algorithms - Minimum spanning trees, Application of Depth first search method, NP – Complete problem

Unit-12 Advanced Data Structures implementation – top-down splay trees, red-black trees, treaps, suffix array and suffix trees, k-d trees, pairing heaps

PRACTICALS:

13. Implementation of linked lists and double linked lists in Java
14. Implementation of stack in Java
15. Implementation of queues in Java
16. Implementation of binary tree traversals,

17. Implementation of Binary trees or Binary search trees
18. Implementation of AVL trees
19. Implementation of splay trees and B-trees
20. Implementation of hashing
21. Implementation of heaps and heap sort
22. Implementation of linear sorting – bucket sort, radix sort
23. implementation of merge sort, quick sort, insertion sort
24. implementation of network flow and depth first search algorithms