

<b>Data Structure and Algorithms</b>				
CLASS S.E. ( INFORMATION TECHNOLOGY)				
SEMESTER III				
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
			<b>HOURS</b>	<b>MARKS</b>
EVALUATION SYSTEM:	THEORY		3	100
	PRACTICAL		3	50
	ORAL		-	-
	TERM WORK		-	25

### 1. Revisiting Java programming construct

Classes types, and objects , Methods, Expressions, Control flow, Arrays, input and output ,Packages, Utilities in the java . lang package

### 2. Object Oriented Design & Analysis of Algorithms

Inheritance, and polymorphism, Exceptions, Interfaces, Abstract Classes, and Casting, Recursion and Other Design patterns , Pseudo – Code, Simple justification Techniques

Measures algorithmic complexity , Space complexity, Time complexity, Some mathematics needed in measuring complexity, The big O-notation used in measuring complexity

#### 3. Stacks, Queues, and Recursion

Recursion , Stacks , Queues , Linked Lists, Double – ended Queues

#### 4. Vectors, Lists, and Sequences

Vectors and Array Lists , Lists, Sequences , Favorite lists and the move –to Front Heuristic

#### 5. Trees

The tree Abstract Data Type, basic Algorithms on Tree, binary Tree, data Structures for representing Tree

## 6. Priority queues

The priority queues Abstract data Type, Implementing a Priority queues with a List

Heaps, Adaptable priority queues

## 7. Maps and dictionaries

The Map Abstract data Type , Hash Tables, The dictionary data Type, Skip Lists, Extensions and Applications for dictionaries

## 8. Search Trees

Binary Search Trees, AVL Trees , Splay Trees , (2,4) Trees , Red – Black Trees , External searching in B- Trees

## 9. Sorting Sets, and Selection

Merge Sort, Heap Sort, Quick Sort, and A Lower Bound on comparison – Based Sorting

BUCKET Sort and radix Sort, the complexity of some sorting algorithms , comparison of Sorting Algorithms , The Set ADT and union / find Structures

## 10. Text Processing

String operations, Pattern Matching Algorithms, Tries, Text compression , Text similarity Testing

## 11. Graphs

The graph Abstract Data Type , Data Structures for Graphs , Graph Traversals

Directed Graphs, Weighted Graphs, Shortest Paths, Minimum spanning Trees

## Text Book

1. Micheal T Goodrich , Roberto Tamassia,(2007) *Data Structure and Algorithm in Java* 3rd Edition Wiley India,
2. Langsam , *Data Structure using JAVA*, Pearson Education
3. Jhon R. Hubbard *Schaum's outline of data structures with JAVA*, McGraw Hill
4. Hubbard, *Data Structure with JAVA*, Pearson Education

## Reference book

- Adam Drozdek (2001) Data Structures and Algorithms in JAVA, 1<sup>st</sup> Edition, Singapore: Thomson Asia Pte Ltd (ISBN 0534-37668-1)
- Nell Data, Daniel T. Joyce, Chip Weems (2004) Object Oriented Data Structures Using JAVA, 1<sup>st</sup> Edition, New Delhi: Narosa Publishing House
- Knuth, Donald E. (1973). *The Art of Computer Programming, Volume 1/Fundamental Algorithms*, 3<sup>rd</sup> Edition, Addison-Wesley.

## Term Work:

Term work shall consist of at least 20 debugged programs and one written test.

Distribution of marks for term work shall be as follows:

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|--|----------|
| 1. Attendance (Theory and Practical)         | 05 Marks |
| 2. Laboratory work (Experiments and Journal) | 10 Marks |
| 3. Test (at least one)                       | 10 Marks |

The final certification and acceptance of TW ensures the satisfactory

Performance of laboratory Work and Minimum Passing in the term work.

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