



**C. U. Shah University, Wadhwan City**  
**Faculty of Computer Science**  
**Name of Program: Bachelor of Computer Application**  
**(BCA)**  
**Semester : IV**  
**W.e.f. June-2015**  
**Teaching & Evaluation Scheme**

| Sr. No | Subject Code | Subject Name                                | Teaching Hours/Week |    |    |       | Credits | Evaluation Scheme/Semester |     |                 |     |           |    |      |             |
|--------|--------------|---|---------------------|----|----|-------|---------|----------------------------|-----|-----------------|-----|-----------|----|------|-------------|
|        |              |   | Th                  | Tu | Pr | Total |         | Theory                     |     |                 |     | Practical |    |      | Total Marks |
|        |              |   |                     |    |    |       |         | Sessional Exam             |     | University Exam |     | Internal  |    | Uni. |             |
|        |              |   |                     |    |    |       |         | Marks                      | Hrs | Marks           | Hrs | Pr        | TW | Pr   |             |
| 2      | 4CS04BDS1    | Introduction to Algorithms & Data Structure | 4                   | -  | -  | 4     | 4       | 30                         | 1.5 | 70              | 3   | -         | -  | -    | 100         |

**Objectives:** To introduce techniques for analyzing the efficiency of computer algorithms and to provide knowledge of various data structures and algorithms.

**Pre-requisites:** Student should aware about core java programming.

**Course Outline:**

| Ch. No | Chapter Name                              | Topics  | Lect. Hours |
|--------|---|---|-------------|
| 1      | Algorithm Introduction                    | What is algorithm<br>Characteristics of an Algorithm<br>Problems, Available Tools & Algorithms<br>Building Blocks of Algorithms<br>Basic Actions & Instructions<br>Control Mechanisms and Control Structures<br>Procedure and Recursion                                     | 5           |
| 2      | Some Pre-Requisites and Asymptotic Bounds | Some Useful Mathematical Functions & Notations<br>---Functions & Notations<br>---Modular Arithmetic/Mod Function<br>Mathematical Expectation<br>Principle of Mathematical Induction<br>Concept of Efficiency of an Algorithm<br>Well Known Asymptotic Functions & Notations | 5           |
| 3      | Divide and Conquer                        | Introduction, General Issues in Divide-and-Conquer<br>Binary Search, Sorting, Merge Sort, Quick Sort,<br>Randomization Quicksort, Finding the Median, Matrix Multiplication   | 8           |
| 4      | Elementary Data Structures                | Recursion, Stacks, Queues, Linked List, Double Ended Queues   | 10          |
| 5      | Hash Tables                               | Direct-address tables: Hash Tables<br>Hash functions: Open addressing, Perfect Hashing  | 5           |
| 6      | Text Processing                           | String Operations, Pattern matching algorithm, Tries<br>Text Comparison   | 5           |
| 7      | Trees                                     | The Tree abstract data type, Basic algorithm on Trees, Binary   | 8           |

|   |                             |   |    |
|---|-----------------------------|---|----|
|   |                             | Trees, Binary Search Trees, AVL Trees, Red-Black Trees,AVLTrees   |    |
| 8 | Greedy Techniques           | Introduction, Minimum Spanning Tree, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm                              | 5  |
| 9 | Elementary Graph Algorithms | Representation of Graphs<br>Breadth – first search<br>Depth first Search<br>Topological Sort<br>Strongly Connected Components | 4  |
|   |                             | Total   | 55 |

**Reference Books:**

1. **Data Structures and Algorithms in Java By Michael T. Goodrich, Wiley Publication**
2. **Introduction to algorithms By Thomas H. Cormen, PHI Publication.**
3. **Object Oriented Data structures using Java By Daniel T. Joyce**
4. **Practical Guide to Data Structure and Algorithms, Wiley Publication.**
5. **The Complete reference Java, TMH Publication**