R.T.M. Nagpur University, Nagpur
FOUR YEAR B.E. COURSE
(Revised Curriculum as per AICTE Model Curriculum)
Computer Science and Engineering
B.E. Second Year Proposed Scheme

Fourth Semester:-

S N	Subject	Teaching Scheme			Evaluation Scheme			Credits	Category
		L	T	P	CA	UE	Total		
1	Discrete Mathematics and Graph Theory	03	-	-	30	70	100	03	PCC-CS
2	Data Structure and Program Design	03	01	-	30	70	100	04	PCC-CS
3	Database Managements Systems	03	01	-	30	70	100	04	PCC-CS
4	Computer Networks	03	-	-	30	70	100	03	PCC-CS
5	Theory of Computation	03	01	-	30	70	100	04	PCC-CS
6	System Programming	03	-	-	30	70	100	03	PCC-CS
7	Data Structure and Program Design-Lab	-	-	02	25	25	50	01	PCC-CS
8	Database Managements Systems-Lab	-	-	02	25	25	50	01	PCC-CS
9	Computer Workshop-II (Python)	-	-	02	25	25	50	01	PCC-CS
10	Constitution of India (Audit Course)	02	-	-	-	-	-	Audit	MC
	Total	20	03	06			750	24	

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: COMPUTER SCIENCE AND ENGINEERING

Subject : Data Structure and Program Design   Subject Code : BECSE402T

Load	Credit	Total Marks	Sessional Marks	University Marks	Total
3 hrs (Theory)	03	100	30	70	100

Aim : To understand the implementation of various data structures and algorithms.

Prerequisite(s): C Language

Course Objective/Learning Objective:

1	To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.
2	To implement data structure Algorithms by using C/C++ Language.
3	To select an appropriate data structure to solve real world problem and compare alternative implementations of data structures with respect to performance.
4	To acquire knowledge on Searching and Sorting techniques.

Course Outcome:
At the end of this course Student are able to:

CO1	Analyze the complexity of algorithms and sorting techniques.
CO2	Apply the concept of stack and queues to solve real world problem.
CO3	Describe and implement linked list operation.
CO4	Demonstrate different methods for traversing trees.
CO5	Utilize the concepts of graphs to build solution. Design and implement searching techniques and hashing function

UNIT I:

Introduction to algorithm: General concepts of data structures, Types of Data Structure with its properties and Operations, Time and space analysis of algorithms, Big oh, theta, and omega notations, Average, best and worst case analysis.

Sorting and Searching Techniques: Selection sort, insertion sort, heap sort, shell sort, linear and binary search.

UNIT II:

Stack & Queue: Representation of Stack & queue using array, Application of stacks, Conversion from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks, Linear Queues, Circular Queues, and Priority Queues.

UNIT III:

Linked List: Representation of ordered list using array and its operation, Linked Lists, Singly linked list, Implementation of linked list using static and dynamic memory allocation, operations on linked list, polynomial representations using linked list, circular linked list, doubly linked list.

UNIT IV:

Trees: General and binary trees, Representations and traversals of trees, Threaded Binary Trees, Binary search trees, the concept of balancing, AVL Trees, B-Trees, B+ Trees.

UNIT V:

Graphs: Representation of Graph, Matrix Representation of Graph, List Representation of Graph, Directed Graphs(Digraphs), Breadth first search and Depth first search, spanning trees.

Hashing: Hash tables, hash functions, hashing techniques, Collision resolution techniques, overflow handling.

Textbooks:

- Classical Data Structure, D. Samanta, Prentice Hall of India.
- Data Structures using C, Aaron M. Tanenbaum, Pearson Education.
- Data Structure with C, Seymour Lipschutz, Tata Mcgraw Hill.

References:

- Ellis Horowitz, Sartaj Sahni & Susan Anderson-Freed, Fundamentals of Data Structures in C, Second Edition, Universities Press.
- An Introduction to Data Structures and Applications, Jean-Paul Tremblay, Paul G. Sorenson, P. G. Sorenson, Tata McGraw Hill Publication.
- Data Structures using C and C++, Y. Langsam, Pearson Education.
- Algorithms in a Nutshell, George H & Garry, O'reilly Publication.
- Data Structure and Algorithms using Python, Rance D. Necaise, John Wiley Publication.

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Subject :   Data Structure and Program Design   Subject Code :   BECSE402P

Load	Credit	Total Marks	Sessional Marks	University Marks	Total
2 hrs (Practical)	01	50	25	25	50

- Ten Practicals based on above syllabus. Course coordinator should make sure that all units will be covered in their list. No study experiment should be included in the list.

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