DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	Data Structures and Algorithms		
Course Code	CSMI11	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	Jan. 2018	Section (if, applicable)	A
Name of Faculty	Dr.B.Nithya	Department	CSE
Email	nithya@nitt.edu	Telephone No.	0431-2503214
Name of Course Coordinator(s) (if, applicable)	Not applicable		
E-mail	-	Telephone No.	-
Course Type	Minor course		

Syllabus (approved in BoS)

CSMI11 Data Structures and Algorithms

Unit –I
Development of Algorithms -Notations and analysis -Storage structures for arrays -Sparse matrices - Stacks and Queues: Representations and applications. linked lists –Doubly linked lists-
Circular linked lists.

Unit –II
Trees: Preliminaries –Binary Trees –Search Tree ADT – Binary Search Trees –Hashing: ADT – Hash Function –Separate Chaining –Open Addressing –Rehashing –Extendible Hashing

Unit –III
Graphs-Representation of graphs -BFS, DFS –Topological Sort-Shortest path problems-Dijkstra's algorithm, Floyd-Warshall, Minimum spanning trees-prims algorithm, Kruskal algorithm.

Unit –IV
Algorithmic paradigms -Divide and Conquer method- Strassen's matrix multiplication -Greedy method -Knapsack Problem-Job sequencing with deadlines –Dynamic Programming-Travelling salesman problem.

Unit –V
Searching and Sorting Techniques-Selection, Bubble, Insertion, Merge, Quick, and Radix sort - Address calculation -Linear search -Binary search.

Text Books
1.J. P. Tremblay and P. G. Sorenson, "An Introduction to Data Structures with applications", Second Edition, Tata McGraw Hill, 1981
2.T. Cormen, C. Lieserson, R. Rivest, and C. Stein, "Introductions to Algorithms", Prentice-Hall/India, 3rdedition, 2009

3.M. Tanenbaum and Augestien, "Data Structures using C", Third Edition, Pearson Education 2007.

Reference Book

1.Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", Universities Press (I) Pvt. Ltd.

COURSE OBJECTIVES

★ To introduce first level topics covering basics in Algorithms and Data Structures.
★ To design and implement linear data structures like Arrays, Stacks, Queues and linked lists.
★ To identify the basic properties of non linear data structures like graphs and trees and model simple applications.

COURSE OUTCOMES (CO)

Course Outcome (CO)	Aligned Programme Outcome (PO)							
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8
Ability to comprehend the basics in algorithms and data structures.	S	M	S	S	S	M	M	B
Ability to solve problems that involve concepts of stack, queue and linked	S	S	S	M	M	S	B	M
Ability to apply the concepts of trees and graphs to provide algorithmic solutions to the real world problems.	S	S	S	M	M	S	B	M

COURSE PLAN – PART II

COURSE OVERVIEW

This course emphasizes algorithm analysis, linear and non linear data structures, various programming paradigms, sorting and searching problems with time complexity.

COURSE TEACHING AND LEARNING ACTIVITIES

L.No	Title	Type		Mode of delivery			
		L	T	C&T	PPT	VL/VC	DEMO
UNIT I							
1.	Notations and Analysis, Running Time Calculation	√		√			
2.	Storage Structures for arrays, Sparse Matrices	√		√			
3.	Stacks: Representations & Operations	√		√			
4.	Stacks: Applications	√	√	√			
5.	Queues: Representations & Operations	√		√			

6.	Queues: Applications	√	√	√			
7.	Single linked list: Representations	√		√			
8.	Single linked list Operations & Programming examples	√		√			
9.	Circular linked list & its operations	√		√			
10.	Doubly linked list & its operations	√		√			
11.	Stack, Queue using lists	√		√			
12.	Programming Assignments-1 & Viva		√				√
	UNIT II						
13.	Binary trees, Expressions using binary tree	√		√			
14.	Binary Search Tree & its operations	√		√			
15.	Binary tree traversal , Threaded binary tree	√		√			
16.	Hashing: Hash function	√		√			
17.	Separate Chaining	√		√			
18.	Open Addressing	√		√			
19.	Rehashing & Extensible Hashing	√		√			
20.	Programming Assignments -1 & Viva		√				√
	UNIT III						
21.	Graphs, Representations	√		√			
22.	Transitive closure, BFS, DFS	√		√			
23.	Topological Sorting	√		√			
24.	Shortest Path Problems (Prims & Kruskal)	√		√			
25.	Shortest Path Problems (Dijkstra's & Warshall algorithm)	√		√			
26.	Exercises		√	√			
27.	Programming Assignments-2 & Viva		√				√
	UNIT IV						
28.	Divide and Conquer method	√		√			
29.	Strassen's matrix multiplication	√		√			
30.	Greedy method	√		√			
31.	Knapsack Problem	√		√			
32.	Job sequencing with deadlines	√		√			
33.	Dynamic programming	√	√	√			
34.	Travelling salesman problem	√		√			
35.	Programming Assignments -2 & Viva		√				√
	UNIT V						
36.	Sorting Techniques: Selection , Insertion & Bubble	√		√			
37.	Merge, Quick and Radix sort	√		√			
38.	Address Calculation & Shell Sort	√		√			
39.	Heap Sort	√		√			
40.	Searching: Binary and Linear Search	√		√			
41.	Programming Assignments -2 & Viva						√

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test	After completion of 2 units	1hr	15
2	Quiz	After completion of next two units	1 hr	15
3	Assignment-1	After completion of Unit 1 & 2	-	10
4	Assignment-2	After completion of Unit 3,4 & 5	-	10
CPA	Retest	After cyle test & Quiz	1hr	15
5	Final Assessment	As per Schedule	3hrs	50

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

➤ Feedbacks are collected before final examination through MIS or any other standard format followed by the institute
➤ Students, through their Class Representatives, may give their feedback at any time to the course faculty which will be duly addressed.
➤ The students may also give their feedback during Class Committee Meeting.

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc)

E-mail/Phone

ATTENDANCE

➤ Minimum 75% is mandatory to write the end semester examination. Students having attendance 65% to 74% are eligible for the end semester exam only after attending the extra classes and submitting assignments. Students have to redo the course, if they have less than 65% of attendance.

➤ Medical Certificate / On Duty Certificate should be submitted immediately after rejoining.

COMPENSATION ASSESSMENT

➤ One compensation assessment will be given after completion of Cycle Test 1 and 2 for the students those who are absent for any assessment due to genuine reason.
➤ The prior permission and required document must be submitted for the absence.

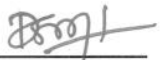## ACADEMIC HONESTY & PLAGIARISM

- ➢ Avoid usage of electronic devices during the class or test or exam.
- ➢ The students are expected to come out with their original solution for the problems given in the assignment. If found to copy from internet/other students, marks will be reduced.
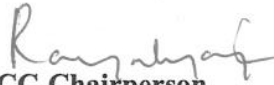
ADDITIONAL INFORMATION

The students can get their doubts clarified at any time with their faculty member with prior appointment.

FOR APPROVAL

Course Faculty _____ CC-Chairperson _____ HOD _____
(B. Nithya)