DEPARTMENT OF COMPUTER SCIENCE & 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)	-		
Session	Jan 2018	Section (if, applicable)	B
Name of Faculty	Mrs.A.Lavanya Mathiyalagi	Department	CSE
Email	lavanyaa@nitt.edu	Telephone No.	0431-2502202
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail		Telephone No.	
Course Type	MI		

Syllabus

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

J. P. Tremblay and P. G. Sorenson, "An Introduction to Data Structures with applications", Second Edition, Tata McGraw Hill, 1981

T. Cormen, C. Lieserson, R. Rivest, and C. Stein, "Introductions to Algorithms", Prentice-Hall/India, 3rd edition, 2009

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

Reference Book

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

COURSE OBJECTIVES

- To understand the various techniques of sorting and searching
- To design and implement arrays, stacks, queues, and linked lists
- To understand the complex data structures such as trees and graphs
- To design and implement various programming paradigms and its complexity

COURSE OUTCOMES

Cos	Aligned Programme Outcome (PO)
Ability to develop programs to implement linear data structures such as stacks, queues, linked lists, etc.	PO 1,2,3,4
Ability to apply the concept of trees and graph data structures in real world scenarios	PO 2,3
Ability to comprehend the implementation of sorting and searching algorithms	PO 2,3,4,7

COURSE PLAN – PART II

COURSE OVERVIEW

Data Structure is a systematic way to organize data in order to use it efficiently. The idea is to reduce the space and time complexities of different tasks. Data structures provide a means to manage large amounts of data efficiently for uses such as large databases and internet indexing services.

Efficient data structures are key to designing efficient algorithms. Some formal design methods and programming languages emphasize data structures, rather than algorithms, as the key organizing factor in software design. Data structures can be used to organize the storage and retrieval of information stored in both main memory and secondary memory.

COURSE TEACHING AND LEARNING ACTIVITIES		
Lect. No	**Topic**	**Mode of Delivery**
	UNIT I	
1.	Notations and analysis	Slides/presentation,board&chalk
2.	Storage structures for arrays	Slides/presentation,board&chalk
3.	Sparse matrices	Slides/presentation,board&chalk
4.	Stacks	Slides/presentation,board&chalk
5.	Queues	Slides/presentation,board&chalk
6.	applications	Slides/presentation,board&chalk
7.	linked lists	Slides/presentation,board&chalk
8.	Doubly linked lists	Slides/presentation,board&chalk
9.	Circular linked lists	Slides/presentation,board&chalk
	UNIT II	
10.	Preliminaries	Slides/presentation,board&chalk
11.	Binary Trees	Slides/presentation,board&chalk
12.	Search Tree ADT	Slides/presentation,board&chalk
13.	Binary Search Trees	Slides/presentation,board&chalk
14.	Hashing: ADT – Hash Function	Slides/presentation,board&chalk
15.	Separate Chaining – Open Addressing – Rehashing	Slides/presentation,board&chalk
16.	Extendible Hashing	Slides/presentation,board&chalk
	UNIT III	
17.	Representation of graphs	Slides/presentation,board&chalk
18.	BFS, DFS	Slides/presentation,board&chalk
19.	Topological sort	Slides/presentation,board&chalk
20.	Shortest path Algorithm - Dijkstra's algorithm	Slides/presentation,board&chalk
21.	Shortest path Algorithm - Floyd-Warshall	Slides/presentation,board&chalk
22.	Minimum spanning trees- prims algorithm	Slides/presentation,board&chalk
23.	Minimum spanning trees -Kruskal algorithm	Slides/presentation,board&chalk
24.	Examples	Slides/presentation,board&chalk

UNIT IV		
25.	Divide and Conquer method	Slides/presentation,board&chalk
26.	Strassen's matrix multiplication	Slides/presentation,board&chalk
27.	Greedy method - Knapsack problem	Slides/presentation,board&chalk
28.	Job sequencing with deadlines	Slides/presentation,board&chalk
29.	Dynamic Programming- Travelling salesman problem	Slides/presentation,board&chalk
30.	Travelling salesman problem	Slides/presentation,board&chalk
UNIT V		
31.	Selection, Bubble	Slides/presentation,board&chalk
32.	Insertion, Merge,	Slides/presentation,board&chalk
33.	Quick, and Radix sort	Slides/presentation,board&chalk
34.	Address calculation	Slides/presentation,board&chalk
35.	Linear search	Slides/presentation,board&chalk
36.	Binary search	Slides/presentation,board&chalk
37.	Example	Slides/presentation,board&chalk

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment -1	Feb 1st week	1 week	5
2	Cycle Test - 1	Feb 2nd week	1 hour	20
3	Assingment - 2	March 4th week	1 week	5
4	Cycle Test -2	April 1st week	1 hour	20
CPA	Compensation Assessment	April 2nd week	1 hour	20
5	End Semester Exam	April 4th week	3 hours	50

Total weightage = 100%

COURSE EXIT SURVEY

- Feedback is collected before every cycle test and after the end semester exam in the feedback forms through MIS*.
- Suggestions from the students for incorporated for making the course more understanding and interesting.
- Students, through their class representative may give their feedback at any time to the course faculty which will be duly addresses.
- Students may also give their feedback during class committee meeting.

COURSE POLICY

MODE OF CORRESPONDENCE

- Email , phone or in person

ATTENDANCE

- Minimum 75% is mandatory to write the end semester examination.
- Students having attendance 65%-74% are eligible for the end semester exam only after justifying their leave. Students have to redo the course, if they have less than 65% percentage of attendance at any cost.
- Students coming late to the class will not be provided attendance for that hour at any cost.
- Medical certificate or on-duty certificate should be submitted immediately after rejoining the next class.

COMPENSATION ASSESSMENT

- Retest will be conducted if there is any valid reason for the absentees of cycle test

ACADEMIC HONESTY & PLAGIARISM

- Students disturbing the class, not attentive and students who do malpractices in assignments and test will not be permitted to attend any test commencing thereafter (including the end semester exam).
- Please turn off electronic devices during classes, such as cell phones, iPods, and laptops.
- For late submission of assignments, marks will be reduced accordingly.

ADDITIONAL INFORMATION

Students can meet the faculty for discussion and queries at any time during working hours seeking prior appointment from the faculty through the representative.

FOR APPROVAL

A. Lavanya
(A. Lavanya Mathiyadagi)
Course Faculty _____ CC-Chairperson _____ HOD _____