DSC

1. DATA STRUCTURES

Discipline	COMPUTER SCIENCE				
Course Code	UK3DSCCSC200				
Course Title	DATA STRUCTURES				
Type of Course	**DSC**				
Semester	III				
Academic Level	2				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5 hours
Pre-requisites	Basic knowledge in C Programming is mandatory.				
Course Summary	This course helps to understand the basic concepts involved in organising, storing, retrieving and modifying data using various data structures.				

Detailed Syllabus:

Module	Unit	Content	Hrs (L + P)
I	**Introduction to Data Structures**		**15**
	1	Introduction to Data Structures: Definition, Classification of data structures -Linear and Non- Linear, Static and Dynamic, Data Structure Operations, Applications of Data Structures	
	2	Array-Single dimensional array, memory representation, Operations-insertion, deletion	

	3	Searching: Linear search, Binary search	
	4	Sorting: Bubble Sort, Selection Sort, and Insertion Sort.	
	5	Time and Space complexities of algorithm	
	6	Multidimensional array- memory representations- row major & column major, Sparse matrix – array representation	
II		**Linked List**	**15**
	4	Linked List: Concept of Linked List, Memory representation , Difference of Linked List and Array.	
	5	Singly Linked List – Memory Representation, Operations - Traversing, Searching, Insertion, Deletion	
	6	Doubly Linked List- Memory representation, Operations-Traversing, Searching, Insertion, Deletion; Circular linked list- concepts only	
III	**Stack & Queue**		**15**
	8	Stack: Implementation and operations on Stack using arrays and linked list	
	9	Applications of Stack – Polish & Reverse Polish notations, Conversion of arithmetic expressions- infix to postfix using stack. Evaluation of postfix expression using stack	
	10	Queue: Implementation and operations on Queue using arrays and linked list, Applications of queue, Deque - Types- Input and output restricted, Priority Queues (Basic concepts)	
IV	**Trees**		**15**
	11	Trees: Concept of Trees, Tree terminologies, Binary tree: Types- Complete Binary tree, Full Binary Tree & Perfect Binary tree, Expression trees.	
	12	Representation of Binary Tree, Traversing Binary Trees – Preorder, Inorder, Postorder	
	13	Binary Search Tree (BST): Creating a Binary Search Tree, Search, Insertion and Deletion operations, applications of trees	
	14	Graphs - Terminologies, Representations, DFS & BFS	
V	**Flexi Module: Not included for End Semester Exams**		**15**

	15	Circular Linked List - Insertion & Deletion Header Linked List - Grounded and Circular Applications of Graphs	

References

1. Seymour Lipschutz, Data Structures, Schaum's outline Series. The McGraw Hill

2. S.K.Srivastava, Deepali Srivastava. Data Structures Through C in Depth. BPB Publications

3. K Sharma. Data Structures using C. Pearson, Second Edition.

4. Ashok N. Kamthane, Introduction to Data Structures in C, Pearson

5.Jean-Paul Tremblay ,Paul G. Sorenson, An Introduction to Data Structures with Application, MCGrawhill, Second Edition.

6. Ten Baum Publisher , Data Structures using C & C++ , Prentice-Hall International.

Lab Exercises

The laboratory work will consist of 20-25 experiments that should be implemented in C language

Part A

1. Implementation of different searching techniques
    - Linear Search
    - Binary Search
2. Implementation of different sorting techniques.
    - Bubble Sort
    - Selection Sort
    - Insertion Sort
3. Stack Operations implemented as array
4. Queue Operations implemented as array

Part B

5. Singly Linked List Operations
6. Doubly Linked List Operations.
7. Stack operations implemented as Linked List
8. Queue operations implemented as Linked List
9. Tree traversals

Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO1	Discuss about data structure classification and applications in searching and sorting	Ap	PSO-1,2, 3
CO2	Demonstrate the concept and usage of linked lists	Ap	PSO-1,2,3
CO3	Summarise about stack, queue and its applications	Ap	PSO-1,2,3
CO4	List various types of trees and operations	Ap	PSO-1,2,3

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Note: 1 or 2 COs/module

Name of the Course: DATA STRUCTURES

Credits: 3:0:1 (Lecture: Tutorial: Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
1	Discuss about data structure classification and applications in searching and sorting	PO-1,2,6,7 PSO-1,2,3	Ap	F, C, P	L	P
2	Demonstrate the concept and usage of linked lists	PO-1,2,6,7 PSO-1,2,3	Ap	F, C, P	L	P
3	Summarise about stack, queue and its applications	PO-1,2,6,7 PSO-1,2,3	Ap	F, C, P	L	P
4	List various types of	PO-1,2,6,7	Ap	F, C, P	L	P

	trees and operations	PSO-1,2,3				

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	-	-	-	1	1	-	3	2	2	-
CO 2	2	2	-	-	-	1	1	-	3	2	2	-
CO 3	2	2	-	-	-	2	1	-	3	2	2	-
CO 4	2	2	-	-	-	2	1	-	3	2	2	-

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics: