

SGK GOVERNMENT DEGREE COLLEGE
Department of Computer Science
Lesson Plan

Name of the Department : Computer Science	
Name of the Lecturer : D.SIVA PHANINDRA	
Group / Course : I BSC., Semester II	
Paper : Data Structures	
Name of the Topic	Types of Data structures, Arrays, Linear list, Linked list
Hours Required	12
Learning Objectives	To learn Types of Data structures, Arrays, Linear list, Linked list and various operations can be performed on Data structures
Previous Knowledge to be reminded	Object oriented programming concepts, Datatypes, Arrays,
Topic Synopsis	A data structure is a collection of data values, the relationships among them, and the functions or operations that can be applied to the data. Primitive Data Structures: Primitive Data Structures are the basic data structures that directly operate upon the machine instructions. Integers, Floating point numbers, Character constants, String constants and Pointers come under this category. Non-primitive Data Structures: Non-primitive data structures are more complicated data structures and are derived from primitive data structures. They emphasize on grouping same or different data items with relationship between each data item. Arrays, Lists and Files come under this category. Linear lists: The elements are ordered within the linear list in a linear sequence. Unlike an array, a list is a data structure allowing insertion and deletion of elements at an arbitrary position of the sequence. Arrays: A set of homogeneous values. An array is a collection of items. Each slot in the array can hold an object or a primitive value. Linked list: an ordered set of data elements, each containing a link to its successor (and sometimes its predecessor).

Thrust Areas	Mathematical operations & Logical operations, Memory allocations
Skills to be learnt by Students	Logical thinking and programming skills
Examples / Illustrations	Programs to illustrate various data types & Data structures
Additional Inputs	Problems to practice
Teaching Aids Used	Blackboard& Chalk, LCD Projector
References Cited	Classic Data Structures, D Samnatha Data structures using C++ ,Sartazsahni
Student Activity Planned after Teaching	Problems solving, Assignment
Any other Activities	Exam

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Name of the Department : Computer Science	
Name of the Lecturer : D.SIVA PHANINDRA	
Group / Course : I BSC., Semester II	
Paper : Data Structures	
Name of the Topic	Stacks, Queues
Hours Required	12
Learning Objectives	To learn Stacks, queues, and operations can be performed
Previous Knowledge to be reminded	Programming concepts, Data structures, OOPs concepts
Topic Synopsis	Stack is a linear data structure which follows a particular order in which the operations are performed. The order may be LIFO(Last In First Out) or FILO(First In Last Out). If the stack is empty, then it is said to be an Underflow condition.A stack is a basic data structure that can be logically thought of as a linear structure represented by a real physical stack or pile, a structure where insertion and deletion of items takes place at one end called top of the stack. Basic operations are performed in the stackar:\ Push: Adds an item in the stack. If the stack is full, then it is said to be an Overflow condition. Pop: Removes an item from the stack. The items are popped in the reversed order in which they are pushed. If the stack is empty, then it is said to be an Underflow condition. Peek or Top: Returns top element of stack. isEmpty: Returns true if stack is empty, else false. A Queue is a linear structure which follows a particular order in which the operations are performed. The order is First In First Out (FIFO). A good example of a queue is any queue of consumers for a resource where the consumer that came first is served first. The difference between stacks and queues is in removing. In a stack we remove the item the most recently added; in a queue, we remove the item the least recently added.

Thrust Areas	Mathematical operations & Logical operators, Memory Organization
Skills to be learnt by Students	Logical Analysis and programming skills
Examples / Illustrations	Programs to illustrate various operations can be performed on stacks, queues
Additional Inputs	Problems to practice
Teaching Aids Used	Blackboard & Chalk, LCD Projector
References Cited	Claasic Data Structurese, D Samnatha Data structures using C++ ,Sartazsahni
Student Activity Planned after Teaching	Problems solving
Any other Activities	Exam

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Name of the Department : Computer Science	
Name of the Lecturer : D.SIVA PHANINDRA	
Group / Course : I BSC., Semester II	
Paper : Data Structures	
Name of the Topic	Trees: Binary trees, Binary search trees, threaded binary trees, Heap trees
Hours Required	12
Learning Objectives	To learn the concepts of trees and operations can be performed on various trees
Previous Knowledge to be reminded	OOPs concepts, Data structures
Topic Synopsis	A tree is a widely used abstract data type (ADT)—or data structure implementing this ADT—that simulates a hierarchical tree structure, with a root value and subtrees of children with a parent node, represented as a set of linked nodes. A binary tree is made of nodes, where each node contains a "left" reference, a "right" reference, and a data element. The topmost node in the tree is called the root. Every node (excluding a root) in a tree is connected by a directed edge from exactly one other node. This node is called a parent. On the other hand, each node can be connected to arbitrary number of nodes, called children. Nodes with no children are called leaves, or external nodes. Nodes which are not leaves are called internal nodes. Nodes with the same parent are called siblings. Binary Search Tree is a node-based binary tree data structure which has the following properties: The left subtree of a node contains only nodes with keys lesser than the node's key. The right subtree of a node contains only nodes with keys greater than the node's key. A threaded binary tree defined as follows: "A binary tree is threaded by making all right child pointers that would normally be null point to the inorder successor of the node (if it exists), and all left child pointers that would normally be null point to the inorder predecessor of the node." A heap is a specialized tree-based data structure which is essentially an almost complete tree that satisfies the heap property.
Thrust Areas	Mathematical operations & Logical operations, Memory allocations

Skills to be learnt by Students	Logical thinking and programming skills
Examples / Illustrations	Programs to illustrate various operations can be performed on trees
Additional Inputs	Problems to practice
Teaching Aids Used	Blackboard & Chalk, LCD Projector
References Cited	Claasic Data Structurese, D Samnatha Data structures using C++ ,Sartazsahni
Student Activity Planned after Teaching	Problems solving, Assignement
Any other Activities	Exam

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Name of the Department : Computer Science	
Name of the Lecturer : D.SIVA PHANINDRA	
Group / Course : I BSC., Semester II	
Paper : Data Structures	
Name of the Topic	Graphs – Traversing, Minimum spanning tree
Hours Required	12
Learning Objectives	To learn the concepts of graphs, and traversing , and applications
Previous Knowledge to be reminded	Trees, Graph theory, polygons
Topic Synopsis	A Graph is a non-linear data structure consisting of nodes and edges. The nodes are sometimes also referred to as vertices and the edges are lines or arcs that connect any two nodes in the graph. More formally a Graph can be defined as,A Graph consists of a finite set of vertices(or nodes) and set of Edges which connect a pair of nodes.Graphs are used to solve many real-life problems. Graphs are used to represent networks. The networks may include paths in a city or telephone network or circuit network. Graphs are also used in social networks like linkedIn, Facebook. For example, in Facebook, each person is represented with a vertex(or node). Each node is a structure and contains information like person id, name, gender, locale etc. Minimum Spanning Tree (MST) In a weighted graph, a minimum spanning tree is a spanning tree that has minimum weight than all other spanning trees of the same graph. In real-world situations, this weight can be measured as distance, congestion, traffic load or any arbitrary value denoted to the edges. Applications of Graph Data Structure. A graph is a non-linear data structure, which consists of vertices(or nodes) connected by edges(or arcs) where edges may be directed or undirected. In Computer science graphs are used to represent the flow of computation.
Thrust Areas	Mathematical operations & Logical operations, Graphs Memory allocations

Skills to be learnt by Students	Logical thinking and programming skills, Optimization
Examples / Illustrations	Programs to illustrate various traversing methods of graphs
Additional Inputs	Problems to practice finding minimum spanning trees
Teaching Aids Used	Blackboard & Chalk, LCD Projector
References Cited	Classic Data Structures, D. Samnatha Data structures using C++ , Sartazsahni
Student Activity Planned after Teaching	Problems solving
Any other Activities	Exam

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Name of the Department : Computer Science	
Name of the Lecturer : D.SIVA PHANINDRA	
Group / Course : I BSC., Semester II	
Paper : Data Structures	
Name of the Topic	Sorting Techniques- Bubble, insertion, selection, merge, quick, Heap sort, Search- linear search, binary search
Hours Required	12
Learning Objectives	To learn Sorting techniques, Searching techniques
Previous Knowledge to be reminded	Arrays, Sorting of various types of data
Topic Synopsis	Sorting is nothing but arranging the data in ascending or descending order. The term sorting came into picture, as humans realized the importance of searching quickly. There are so many things in our real life that we need to search for, like a particular record in database, roll numbers in merit list, a particular telephone number in telephone directory, a particular page in a book etc. All this would have been a mess if the data was kept unordered and unsorted. Sorting arranges data in a sequence which makes searching easier. There are many different techniques available for sorting, differentiated by their efficiency and space requirements. Following are some sorting techniques : Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort Linear search is a very basic and simple search algorithm. In Linear search, we search an element or value in a given array by traversing the array from the starting, till the desired element or value is found. It compares the element to be searched with all the elements present in the array. Linear Search is applied on unsorted or unordered lists, when there are fewer elements in a list. Binary Search is applied on the sorted array or list of large size. It's time complexity of $O(\log n)$ makes it very fast as compared to other sorting algorithms. The only limitation is that the array or list of elements must be sorted for the binary search algorithm to work on it.

Thrust Areas	Mathematical operations & Logical operations, Sorting techniques, data organization
Skills to be learnt by Students	Logical thinking and programming skills
Examples / Illustrations	Programs to illustrate various sorting and searching techniques
Additional Inputs	Problems to practice sorting techniques and searching techniques
Teaching Aids Used	Blackboard & Chalk, LCD Projector
References Cited	Claasic Data Structurese, D Samnatha Data structures using C++ ,Sartazsahni
Student Activity Planned after Teaching	Problems solving, Assignment
Any other Activities	Exam

Signature of the Lecturer