MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

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Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

MUST KNOW CONCEPTS | MKC

CSE | **2020-21**

Course Code & Course Name : 19CSC01-Data Structures and Algorithms

Year/Sem/Sec : II/III/B

S.No.	Term	Notation (Symbol)	Concept / Definition / Meaning / Units / Equation / Expression	Units
Unit-I : Introduction				
1.	Data		Data are simply values or sets of values	
2.	Information		Processed Data	
3.	Datum		Singular form of Data	
4.	Data		Plural form of Data	
5.	Data structures	DS	Way of organizing data in a computer called DS	
6.	Classification of DS		Static data structures, Dynamic data structures	
7.	Static data structures		Fixed size data structure.EX: Array, pointers, structures	
8.	Dynamic data structures		Variable size data structure. Ex: linked lists, stacks, queues, trees	
9.	Types of data structure		Linear data structure., Non-linear data structure	
10.	Linear data structures		Data are arranged in sequential order	
11.	Non-linear data structure		Data structures that don't have a linear relationship between its adjacent elements but have a hierarchical relationship	
12.	Abstract data type	ADT	Set of operations for which the implementation of the data structure is not specified	
13.	Primitive data types		Each variable has a specific data typeit tells - size, range called primitive data types	
14.	4 basic primitive data		Integer , floating-point ,character and	

	types		Pointer	
15.	Pointer		Special type of variables that are used to store address of another variable	
16.	Searching		Finding an element position in a given array called searchingtype: linear search, binary search	
17.	Efficiency of DS		Efficient Algorithm that takes least possible running time and consumes least memory space	
18.	Asymptotic analysis		Measures the performance of the algorithm with the change in the order of the input size	
19.	Case complexity		Worst case complexity, best case complexity and average case complexity	
20.	Asymptotic complexity		Approximate measure of time complexity is called Asymptotic complexity	
21.	Asymptotic notations		Is measured with the help of asymptotic notations	
22.	Time complexity		Quantifies the amount of time taken by an algorithm to run as a function	
23.	List of Asymptotic Notations		Theta notation, Omega notation and Big-O notation	
24.	Logn		A big problem is solved by cutting the original problem in smaller sizes, by a constant fraction at each step	
25.	N (linear)		A small amount of processing is done on each input element	
Unit-II : Stacks And Queues				
26.	Array		Fixed-size DS	
27.	Recursion function		Recursion is an approach in which a function calls itself with an argument	
28.	Stack		Stack is an ordered collection of elements in which insertions and deletions are restricted to one end called top	
29.	Top		Insertions and deletions of stack take place in top pointer	

30.	Push operation		Inserting an element in stack	
31.	Pop operation		Removing an element from stack	
32.	Peek operation		Viewing top element of stack	
33.	Empty stack		If top=-1 represent empty stack	
34.	Ful		If top=maxsize-1 represent full stack	
35.	Queue		Queue is an ordered collection of elements in which insertions and deletions take place in 2 ends	
36.	Rear end		The end from which elements are added referred to rear end	
37.	Front end		End from which deletions are made is referred to as the front end	
38.	Priority queue		Priority queue is a collection of elements, each containing a key referred as the priority for that element	
39.	Enqueue		Inserting an element in queue	
40.	Dequeue		Removing an element from queue	
41.	Front		Ptr points to 1,st element of queue	
42.	Rear		Ptr points to last element of queue	
43.	Types of queues		Linear queues, Circular queues and Priority queue	
44.	Applications of stacks		Reversing a string Balanced parenthesis Evaluation of arithmetic expressions	
45.	Underflow		Checking queue is empty (contain no elements in array) called underflow	
46.	Overflow		Checking queue is full (contain all elements in array) called overflow	
47.	LIFO		Last in first out (principle followed by stack)	
48.	FIFO		First in first out(principle followed by stack queue)	
49.	Max heap		The key at root must be maximum among all keys present in binary heap	
50.	Min heap		The key at root must be minimum among all keys present in binary heap	

Unit-III : Linked List				
51.	Structure		Structure is a collection of variables belongings to the different data type	
52.	Dynamic memory allocation		The process of allocating memory at runtime is known as dynamic memory allocation	
53.	Malloc()		Allocates requested size of bytes in memeory	
54.	Free		Releases previously allocated memory	
55.	Realloc		Modify the size of previously allocated space	
56.	Singly linked list		Linked list elements are not stored at contiguous location	
57.	Doubly linked list		Contains an extra pointer, typically called previous pointer, together with next pointer and data	
58.	Circularly linked list		Linked list where all nodes are connected to form a circle. There is no null at the end	
59.	Operations of linked list		Creation, insertion(in first, middle and last), deletion(in first, middle and last),searching, traversing	
60.	Application of linked list		Polynomial manipulation Stacks and Queues	
61.	Infix notation		X + Y ,Operators are written in-between their operands	
62.	Postfix notation		X Y +, Operators are written after their operands.	
63.	Prefix notation		+ X Y, Operators are written before their operands	
64.	Other name for Postfix notation		Reverse Polish notation	
65.	Other name for Prefix notation		also known as "Polish notation	
66.	Post fix expression for (a+b*c)/d		abc*+d/	
67.	Pre fix expression for (a+b*c)/d		/+a*bcd	

68.	Head		First node of list	
69.	Fields of Single linked list node		Data and next	
70.	Next		Address of next node of list	
71.	Fields of Double linked list node		Data, next and previous	
72.	previous		Address of previous node of list	
73.	Isempty of list ()		If head== NULL represent empty list	
74.	Traversing		Operation perform viewing of all element in the list	
75.	Structure		Structure is a collection of variables belongings to the different data type	
Unit-IV : Trees				
76.	Tree		A tree is a non-linear data structure, which represents hierarchical relationship between individual data items	
77.	Height of a Tree		Length of the longest path from the root to a leaf	
78.	Path in a tree		Sequence of distinct nodes in which successive nodes are connected by edges	
79.	Leaf node		A node that has no children	
80.	Binary tree nodes		A binary tree is a tree in which every non-leaf node has atmost two children	
81.	Full binary tree		A full binary tree is a tree in which all leaves are on the same leve	
82.	Complete binary tree		Is a binary tree in which every level, except possibly the last, is completely filled	
83.	Right-skewed binary tree		Binary tree is a tree, which has only right child nodes	
84.	Representing a binary tree		Linear representation using arrays. Linked representation using pointers.	
85.	Tree traversal		Moving through all the nodes in the binary tree	
86.	Types of tree traversal		Preorder traversal, Inorder traversal and Postorder traversal	

87.	Tasks performed for traversing a binary tree		Visiting a node. Traverse the left subtree Traverse the right subtree	
88.	Preorder traversal		Process the root node Traverse the left subtree Traverse the right subtree.	
89.	Inorder traversal		Traverse the left subtree. Process the root node. Traverse the right subtree	
90.	Postorder traversal		Traverse the left subtree Traverse the right subtree. Process the root node	
91.	Binary search tree		Binary tree, in which , the values in any left subtree is less than the value of its parent node, the values in any right subtree is greater than the value of its parent node and the left and right subtrees of each node are again binary search trees	
92.	Property of heap		Structure property and Heap property	
93.	Structure property		It is a complete binary tree.	
94.	Heap property		Heap property - For a "max heap", the property is that the value of each node is always less than or equal to the value of its parent.	
95.	Root		In a tree data structure, the first node is called as Root Node	
96.	Parent node		The node which has child / children	
97.	Siblings		nodes which belong to same Parent	
98.	Degree		total number of children of a node is called as DEGREE of that Node	
99.	AVL Tree		Balanced Binary search tree	
100.	Balanced factor		Height of left subtree- Height of right subtree	

Unit-V : Sorting And Hashing				
101.	Hashing		Searching technique in O(1) time complexity	
102.	Hash function		Hash_key=key mod tablesize	
103.	Collision in hashing		When an element is inserted, it hashes to the same value as an already inserted element, and then it produces collision.	
104.	Separate chaining		Separate chaining is a collision resolution technique to keep the list of all elements that hash to the same value	
105.	Open addressing		Open addressing is a collision resolving strategy in which, if collision occurs alternative cells are tried until an empty cell is found	
106.	Types of collision resolution strategies in open addressing		Linear probing Quadratic probing	
107.	Probing		Process of getting next available hash table array cell	
108.	Linear probing		F(i)=i. Hi(x)=(hash(x)+f(i))mod tablesize . I=1,2,3,4…..	
109.	Quadratic probing		$F(i)=i^2$. Hi(x)=(hash(x)+f(i))mod tablesize . I=1,2,3,4…..	
110.	Sorting		A sorting algorithm is used to rearrange a given array or list elements in ascending or descending order.	
111.	Types of internal sorting		Bubble Sort Insertion Sort Selection Sort Quick Sort Merge Sort Heap Sort	
112.	Classification of sorting		Internal sorting and external sorting	
113.	Internal sorting		internal sorting the data that has to be sorted will be in the main memory	
114.	External sorting		External sorting it will on disks, outside main memory	
115.	Types of external sorting		Two-way merge sort ,radix sort	

116.	Time complexity of bubble sort		Θ (n)	
117.	Divide-and-conque		Divide: Break the given problem into subproblems of same type.Conquer: Recursively solve these subproblemsCombine: Appropriately combine the answers	
118.	Not a stable sorting algorithm		Bubble sort	
119.	Not a stable sorting algorithm		Merge sort	
120.	O(nlogn)		Running merge sort on an array of size n which is already sorted	
121.	O(n log n))		The time complexity of a quick sort algorithm	
122.	Time complexity of insertion sort		Θ (n)	
123.	Mod function %		Returns remainder value	
124.	7%8		7	
125.	10%8		2	
Placement Questions				
126.	Last in last out		Stack is also called as	
127.	Queue		……. Is a pile in which items are added at one end and removed from the other	
128.	Stack		…… is very useful in situation when data have to stored and then retrieved in reverse order	
129.	Stack		DS used for depth first traversal	
130.	Queue		What data structure is used in breadth first search of a graph to hold nodes	
131.	Dequeues		A …….. is a linear list in which insertions and deletions are made to from either end of the structure.	
132.	ABDECF		The post-order traversal of the binary tree is DEBFCA. Find out the pre-order traversal	

133.	Algorithm used to find minimum spanning tree		ruskal's algorithmPrim's algorithm	
134.	Dijkstra algorithm		Algorithm used to find shortest path in graph	
135.	floyd-warshall all pairs shortest path algorithm		algorithm computes the shortest paths between each pair of nodes	
136.	Single Source		Dijkstra algorithm is also called the ……. shortest path problem	
137.	Binary Search Trees		The in-order traversal of the tree will yield a sorted listing of elements of tree in ……..	
138.	Edge begins at u and ends at v		In a graph if e=(u,v) means	
139.	Overflow		Before inserting into stack one must check the condition	
140.	double ended queue		The another name of dequeue is ……	
141.	Underflow		efore deletion condition into stack …… has to be checked.	
142.	Front=Null		The condition indicate the queue is empty	
143.	Front=Rear		The condition indicate the queue has one node is	
144.	Top		The pointer associated with the stack is ……...	
145.	Selection		If the number of records to be sorted is small, then …… sorting can be efficient.	
146.	Running time		measures the …… as a function of the number n of items to be sorter	
147.	Selection sort		Which of the following sorting algorithm is of priority queue sorting type	
148.	Quick sort		Partition and exchange sort is ……..	
149.	Merge sort		Which of the following sorting algorithm is of divide and conquer type?	
150.	Dircted Acyclic Graph		Connected graph T without any cycles is called ……..	

Faculty Team Prepared **Signatures** **HoD**

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