Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18CSI6211**:** Data Structures and Algorithms

COURSE OUTCOMES

CO1: Develop simple algorithms for solving problems

CO2: Explain the basic data structures and its operations.

CO3: Explain basics of hashing and solve problems using trees

CO4: Summarize various searching and sorting algorithms.

CO5: Make use of graph-based algorithms to solve problems

CO6: Explain the concept of time complexity and space complexity.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	What are the benefits of top down design approach in data structures and algorithms?	CO1	[K_2]
2.	How to measure the efficiency of the data structure used to build a system?	CO1	[K_2]
3.	What is an Abstract Data Type? How does it differ from a data structure?	CO2	[K_2]
4.	Interpret dequeue operation with an algorithm.	CO2	[K_3]
5.	State the limitations in implementing a binary tree. (Any 4)	CO3	[K_3]
6.	What is a hash function?	CO3	[K_1]
7.	Enlist the applications of sorting algorithms used in data structures.	CO4	[K_2]
8.	Why is external sorting important in managing large data base systems?	CO4	[K_2]
9.	What is a graph? Mention its applications.	CO5	[K_2]
10.	Identify the best case execution time complexity for the following sorting algorithm	CO6	[K_3]

Type of sort	Best case time complexity	Space complexity
Insertion sort		
Heap sort		

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Explain the common problem solving strategies in data structures.	8	CO1	[K_2]
	b)	How to find the Fibonacci of N numbers? Explain the algorithm development process and write the algorithm description.	8	CO1	[K_3]
12.	a)	How to insert and delete an element from a doubly linked list? Explain with a pseudocode.	8	CO2	[K_3]
	b)	Demonstrate any two operations of stack operations with a C code.	8	CO2	[K_2]
13.	a)	What is an AVL tree? Why is an AVL Tree known as self- balancing binary search tree? Explain left rotation and right rotation in AVL trees with a suitable example.	10	CO3	[K_2]
	b)	State the advantage of tree traversal in data structures. Apply In-order and Pre-order tree traversals for the tree given in Figure 1.	6	CO3	[K_3]

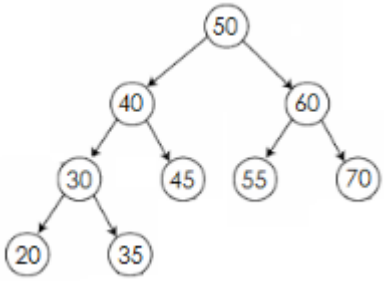

Figure 1

14.	a)	What are the advantages and disadvantages of using Heap Sort over other sorting algorithms? Explain max heap with a suitable example.	8	CO4	[K_3]
	b)	Illustrate Merge sort with an example.	8	CO4	[K_2]
15.	a)	Explain Prim's algorithm for Minimum Spanning Tree(MST) with an example.	8	CO5	[K_2]
	b)	What is Dijkstra's Algorithm, and what problem does it solve? Describe the steps involved in Dijkstra's Algorithm.	8	CO5	[K_2]

16. a) What is time and space complexity? Fill in the table given below. 8 CO6 [K_3]

Data structure	Time complexity (Best case)	Space complexity
Array		
Stack		
Queue		
Singly linked list		

b) Represent the Big-o-notation for the following complexity classes. 8 CO6 [K_3]

Complexity classes	Big-O-Notation
Constant	
Logarithmic	
Linear	
Quadratic	

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