



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(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 1 = 10 Marks)**

1. Identify the primary purpose of a feasibility analysis in problem-solving. CO1 [K₃]
 - a) To implement the solution immediately b) To evaluate the practicality and viability of proposed solutions
 - c) To avoid exploring alternative solutions d) To document the results of problem-solving
2. Top-down Design contribute to code maintainability by CO1 [K₂]
 - a) Implementing dependable modules b) Resulting in longer and more complex code
 - c) Organizing code into manageable modules, making it easier to maintain d) It has no impact on code maintainability
3. Match the List ADT Operations with their Descriptions. CO2 [K₂]

List I	List II
A. append(element)	i. Removes the first occurrence of the specified element from the list.
B. index(element)	ii. Removes and returns the element at the specified position in the list.

C. pop(index)	iii. Adds the specified element to the end of the list.
D. remove(element)	iv. Returns the index of the first occurrence of the specified element in the list.

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	iv

4. void fun(Queue *Q) CO2 [K₃]

```
{
    Stack S;
    while (!isEmpty(Q))
    {    push(&S, deQueue(Q));    }
    while (!isEmpty(&S))
    {        enqueue(Q, pop(&S));    }
}
```

- a) Removes the last from Q b) Keeps the Q same as it was before the call
c) Makes Q empty d) Reverses the Q

5. Which of the following traversal outputs the data in sorted order in a BST? CO3 [K₂]

- a) Preorder b) Inorder
c) Postorder d) Level order

6. Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function $x \bmod 10$, which of the following statements are true? CO3 [K₂]

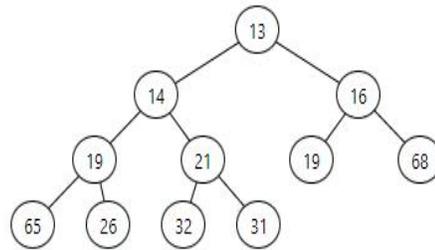
- i. 9679, 1989, 4199 hash to the same value ii. 1471, 6171 hash to the same value
iii. All elements hash to the same value iv. Each element hashes to a different value
a) i only b) ii only
c) i and ii only d) iii and iv only

7. Identify the sorting algorithm that will take least time when all elements of input array are identical CO4 [K₃]

- a) Insertion Sort b) Heap Sort
c) Merge Sort d) Selection Sort

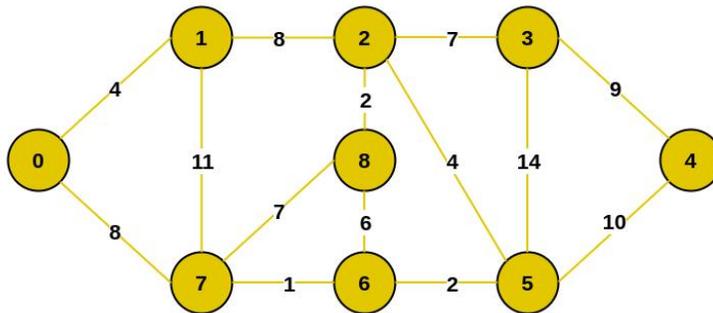
8. Consider the array of eight integers to be sorted using quicksort: 2 5 1 7 9 12 11 10. CO4 [K₃]

21. a) Outline the essential steps to perform binary search. 7 CO1 [K₂]
 b) Summarize any two efficiency considerations for algorithms with an example. 7 CO1 [K₂]
22. a) Construct the code to find a particular element in a singly linked list recursively and non-recursively. 7 CO2 [K₃]
 b) Solve the expression “2 3 1 * + 9 -“ to postfix using stack. Specify the steps in evaluating the above expression. 7 CO2 [K₃]
23. a) Construct AVL Tree for the following sequence of numbers 50 , 20 , 60 , 10 , 8 , 15 , 32 , 46 , 11 , 48 7 CO3 [K₃]
 b) Consider a binary heap tree as shown below. 7 CO3 [K₃]



Write the steps in implementing delete_min heap operation in the given binary heap tree.

24. a) Consider the input array 142, 543, 123, 65, 453, 879, 572, 434, 111, 242, 811, 102. Show the step-by-step sorting of the given array using heapsort. 7 CO4 [K₃]
 b) Construct a function to perform the partition step of Quick Sort. 7 CO4 [K₃]
25. a) Construct the algorithm to implement dijkstra’s shortest path algorithm using priority_queue (heap). 7 CO5 [K₃]
 b) Find the Minimum Spanning Tree for the following graph 7 CO5 [K₃]



26. a) List the five applications of depth-first search. Explain any two applications with an example. 7 CO6 [K₂]
 b) NP-complete problems are the hardest NP problems. Justify with an example. 7 CO6 [K₂]
