



B.E DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Third Semester

COMPUTER SCIENCE AND ENGINEERING

U18CSI3201: Data Structures

COURSE OUTCOMES

- CO1:** Develop applications using stack and queue data structures.
CO2: Develop applications to retrieve records from database using hashing techniques.
CO3: Compare efficiency of various searching techniques using different tree data structures.
CO4: Compare efficiency of various sorting techniques using different data structures.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

- | | | |
|---|-----|-------------------|
| 1. Define Big O notation. Represent any one algorithm which time complexity is represented as O(N). | CO1 | [K ₁] |
| 2. What is the disadvantage of normal Queue? How is it rectified in circular Queue? | CO1 | [K ₁] |
| 3. Outline a routine to print the alternate nodes in linked list. | CO1 | [K ₂] |
| 4. What do you mean by collision in hashing? Give an example | CO2 | [K ₁] |
| 5. Compare closed hashing and open hashing? | CO2 | [K ₂] |
| 6. What is the time complexity of Binary Search? Give the reason for it. | CO3 | [K ₁] |
| 7. Insert the following input in sequence in a binary search tree: 34,67,12,98,35,56 and 123 | CO3 | [K ₃] |
| 8. Insert the following in sequence in AVL tree: 5,10,15,7,6. Do the necessary rotations. | CO3 | [K ₃] |
| 9. State the difference between insertion and bubble sort. | CO4 | [K ₂] |
| 10. What is the average-case and worst-case time complexity of Quick and Merge Sort? | CO4 | [K ₁] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

- | | | | |
|--|---|-----|-------------------|
| 11. a) Build an algorithm to search an item in a list using binary search | 8 | CO3 | [K ₃] |
| b) Explain with examples the asymptotic notations and compare different rate of growth of algorithm with an example for each | 8 | CO1 | [K ₂] |

12. Explain an algorithm to do the following using array in Stack data structure: 16 CO1 [K₂]
- i) Create
 - ii) Insert
 - iii) Delete
 - iv) Search an item
 - v) To check whether it is empty or not
 - vi) To get the top of the stack
13. Build algorithms for the following in doubly linked list: 16 CO1 [K₃]
- Create a doubly linked list.
 - Insert an item at all positions.
 - Delete an item in all positions.
 - Display the list.
14. a) Given input {4371,1323,6173,4199,4344,9679,1989} and a hash function $h(x) = x \pmod{10}$, show the resulting: 12 CO2 [K₃]
1. Separate chaining hash table
 2. Open addressing hash table using linear probing.
 3. Open addressing hash table using quadratic probing.
 4. Open addressing hash table with second hash function $h_2(x) = 7 - (x \pmod{7})$.
- b) What is Extendible hashing? Explain 4 CO2 [K₁]
15. a) Explain with an example about B+ tree and threaded binary tree 6 CO3 [K₂]
- b) Identify an algorithm to create AVL tree with all rotations. 10 CO3 [K₃]
16. Develop an algorithm to do Heap sort with all subroutines. Do the steps for the following data to sort using heap sort: 16 CO4 [K₃]
- 12,65,3,89,43,87,345,2,9,145,56
