Roll No. Total No. of Pages: 03

Total No. of Questions: 09

B.Tech. (AI&ML) / (Artificial Intelligence (AI) and Data Science) / (CSE) / (CSE) (AI&ML) / (CSE) (Data Science) / (CSE) (IOT) / (Data Science)/ CSE (Internet of Things and Cyber Security including Block Chain Technology) (Sem-3)

DATA STRUCTURE & ALGORITHMS

Subject Code: BTCS-301-18
M.Code: 76436
Date of Examination: 16-06-2023

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

- a) Give any two disadvantages of Big O notation.
- b) What do you mean by Time-Space trade off? Give example.
- c) Give one advantage and one disadvantage of using Binary search over linear search techniques.
- d) What is Big O for push(), pop(), isempty(), isfull() operations for array implementation of stack?
- e) What is the disadvantage of simple queue over circular queue in array implementation of queue? Give example.
- f) Give any two applications of circular linked list.
- g) What are AVL trees? How they are different from Binary search tree?
- h) What is the advantage of merge sort over quick sort?
- i) Define complete graph, strongly connected graph.
- j) Give adjacency list and adjacency matrix representations of graph data structures.

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SECTION-B

- 2. Give the algorithm of Tower of Hanoi problem with n disks. Derive the total number of moves in this problem.
- 3. The keys 12, 18, 13,2, 3,23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \mod 10$ and linear probing. What is the resultant hash table (also show intermediate tables)?
- 4. Write algorithms to insert and delete an element from array implementation of circular queue.
- 5. Illustrate execution of quick-sort (in increasing order) in the sequence

```
44 33 11 55 77 90 40 60 99 22 88
```

6. Find the time complexity of the following code and mention it in Big O

er.cor

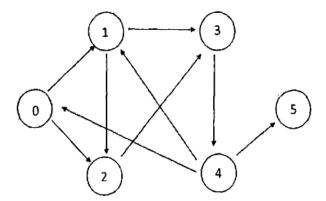
```
int fun(int n) \{
int count = 0;
for (int i = n; i > 0; i /= 2)
for (int j = 0; j < i; j ++)
for (int k = 0; k < j; k++)
count+= 1;
return count;
```

SECTION-C

- 7. Write an algorithm to delete all the occurrences of an element say 'n' from given linear linked list.
- 8. Define B tree. Draw the B tree of order 5 of the following data:

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9. What is DFS and BFS traversal of graph? Give the DFS and BFS traversal (starting with node 0) of graph. Show all intermediate steps



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