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 :

1. **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.

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

```
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 :

   92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78

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