Roll No…….. **Total No. of Printed Pages: 2**
Total No. of Questions: [09]

B. Tech. CSE (Semester – 3rd)
DATA STRUCTURE & ALGORITHMS
Subject Code: BCSES1-302/BCSEM1001
Paper ID: [18111112]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a) What is data structure? List various operations that can be performed on data structure.
b) What is time-space trade off? Discuss.
c) What do you mean by abstract data types? Give an example.
d) Write any four applications of stacks.
e) What is priority queue? What are the various methods to implement a priority queue? Discuss briefly.
f) Compare and contrast binary search and linear search algorithms.
g) Explain hashing, hash table and a hash function.
h) Write any two disadvantages of singly linked list over doubly linked list.
i) Define Binary Search Tree?
j) Define adjacency matrix?

Section – B **(5 marks each)**

Q2. What is analysis of an algorithm? Explain the Asymptotic Notations used while analyzing an algorithm.

Q3. Write algorithms Push(STACK, ITEM) and Pop(STACK, ITEM) to insert and delete an ITEM from stack STACK. Consider following stack of characters with MaxSize =8.
STACK: A, C, D, F, K,__,__,__,
Describe the stack as following operations take place:

a) Pop(STACK, ITEM) d) Push(STACK, P)
b) Pop(STACK, ITEM) e) Pop(STACK, ITEM)
c) Push(STACK, L) f) Push(STACK, R)

Q4. Write algorithm to insert an item at the end of one way linked list and delete an item from the front of a one way linked list. Also calculate time complexity of each algorithm.

Q5. Define tree traversals of a binary tree and find a binary tree whose preorder and in-order traversals are given:

Preorder : G B Q A C P D E R

In-order : Q B C A G P E D R

Q6. What is Graph? How a graph can be represented in memory? Explain each method using a suitable example.

Section – C **(10 marks each)**

Q7. Write algorithm to implement quick sort? Find its worst, average and best case time complexities. Compare it's complexity with bubble sort.

Q8. What is collision in hashing? Discuss various collision handling methods with help of an example data.

Q9. Write an algorithm Reverse Polish (Q, P) to convert an infix expression Q to postfix expression P using stacks. Consider the following infix expression Q:

Q: ((A+B)*D)^(E-F)

Use the algorithm Reverse Polish (Q, P) to translate Q into its equivalent postfix expression P.