Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA – SEMESTER – II • EXAMINATION – SUMMER 2018

Subject Code: 2620001 **Date: 18-May-2018**

Subject Name: Data Structures (DS)

Time: 10.30 am to 1.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Attempt any seven out of following **07**

a. List out any three applications of data structure.
b. What is time complexity?
c. Define primitive data structure.
d. What is stack structure?
e. Write the 'C' structure for BT node.
f. Define null graph.
g. M-way tree definition.
h. What is Pseudo Code?
i. Define spanning tree.
j. What is forest?

(b) Write syntax, example and use of any Three String Functions. **07**

Q.2 **(a)** I. What are the major data structures used in the following areas : RDBMS, Network data model & Hierarchical data model. ? **03**

II. How many minimum number of queues needed to implement the priority queue? Why? **04**

(b) i. What is the difference between a queue and a stack? Give Examples of Both. **04**

ii. Write an algorithm to traverse a linked list. **03**

OR

(b) Consider the following stack of characters, where STACK is allocated N = 7 memory cells **07**

STACK : A,C,D,F,K,_,_. (_ means empty allocated cell)

Describe the stack as the following operations takes place:

(a) POP(STACK, ITEM)
(b) POP(STACK, ITEM)
(c) POP(STACK, ITEM)
(d) PUSH(STACK, R)
(e) PUSH(STACK,L)
(f) PUSH(STACK, S)
(g) PUSH(STACK,P)

Q.3 **(a)** I. Evaluate Following post-fix expression (P) **03**

P: 12 , 7 , 3 , - , / , 2 , 1 , 5 , + , * , + ,)

II. Translate infix expression into its equivalent post fix expression in step by step manner : A*(B+D)/E-F*(G+H/K) **04**

(b) Describe Hashing Function along with following hashing methods- **07**

✧ Folding Method
✧ Mid-square Method

✧ Division Method

OR

Q.3 **(a)** Write Recursive and Non-recursive algorithm for Factorial number. Also compare the complexity of each to determine the better one. **07**

(b) Write an algorithm for Depth First Traversal (DFT). How DFT is different than Breadth First Traversal (BFT). **07**

Q.4 **(a)** Define the characteristics of Binary Search Tree (BST). Construct a BST by inserting following elements **07**
10, 3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25.

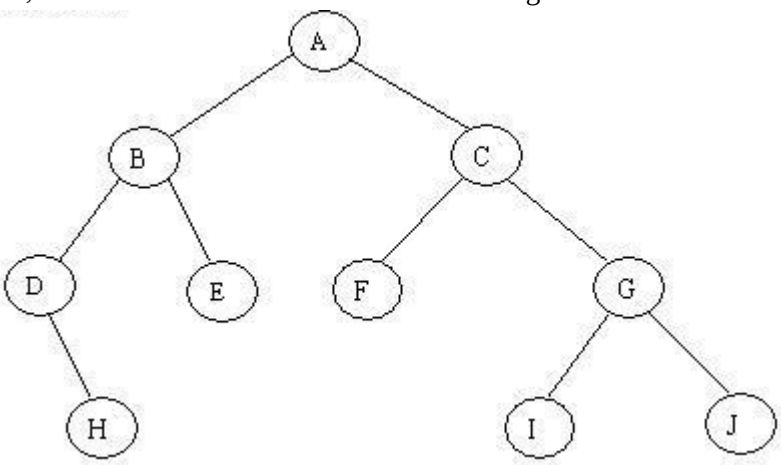
(b) Discuss following search trees **07**
- ✧ Height Balanced
- ✧ 2-3 Trees

OR

Q.4 **(a)** List out 5 popular sorting methods and their complexity. **07**

(b) Explain pass by pass procedure of Selection sort along with suitable example. **07**

Q.5 **(a)** Write Recursive algorithms of Pr-Order, Post-Order, and In-Order Traversal. Find out Pre, Post and In Order Traversals for following BT **07**



(b) Write short notes on followings **07**
- ✧ Garbage Collection
- ✧ Collision Resolution Techniques

OR

Q.5 **(a)** Write and explain Dijkstra's algorithm for shortest path. **07**

(b) Write short notes on followings **07**
- ✧ KWIC Indexing
- ✧ Text Handling
- ✧ Asymptotic Notation

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