Seat No.: _____                          Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY
### BE - SEMESTER– III EXAMINATION – SUMMER 2020

**Subject Code: 3130702**                          **Date:27/10/2020**

**Subject Name: Data Structures**

**Time: 02:30 PM TO 05:00 PM**                          **Total Marks: 70**

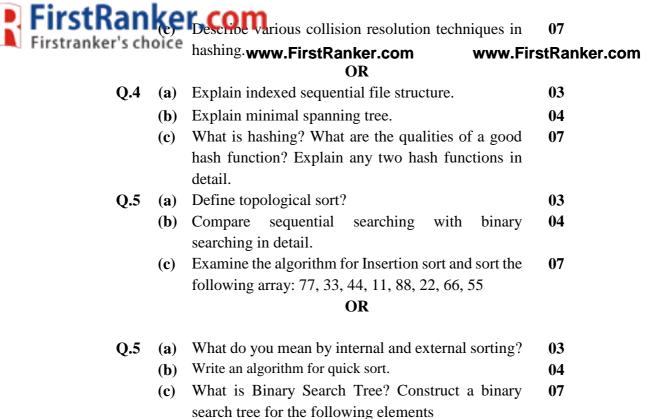**Instructions:**
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

|  |  |  | **Marks** |
|---|---|---|---|
| **Q.1** | **(a)** | Differentiate between data types and data structures. | **03** |
|  | **(b)** | Answer the followings: | **04** |
|  |  | (1) Give examples of Linear and Non-Linear Data Structures. |  |
|  |  | (2) What do you mean by Abstract Data Types? |  |
|  | **(c)** | Discuss and write a program to implement queue functions using arrays. | **07** |
| **Q.2** | **(a)** | Distinguish between stack and queue. | **03** |
|  | **(b)** | What is top of stack? Why stack is called LIFO list? | **04** |
|  | **(c)** | What is a circular queue? How do you check the queue full condition? Write an algorithm to count the nodes in a circular queue. | **07** |
|  |  | **OR** |  |
|  | **(c)** | Explain creation, insertion and deletion of doubly linked list with example. | **07** |
| **Q.3** | **(a)** | What are binary trees? Mention different types of binary trees with example. | **03** |
|  | **(b)** | What is a graph? Explain various representations of graphs. | **04** |
|  | **(c)** | Write an algorithm to add a node into a binary search tree. | **07** |
|  |  | **OR** |  |
| **Q.3** | **(a)** | What is B -tree of order m? Draw a B-tree of order 3. | **03** |
|  | **(b)** | Construct a binary tree having the following traversal sequences: <br> Preorder traversal A B C D E F G H I <br> Inorder traversal B C A E D G H F I | **04** |
|  | **(c)** | Discuss algorithm of Breadth First Search (BFS) traversal for a Graph. Explain with an example. | **07** |
| **Q.4** | **(a)** | Explain Sequential file organizations and list its advantages and disadvantages. | **03** |
|  | **(b)** | How access of record is performed in multi key file organization? | **04** |

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**(c)** Describe various collision resolution techniques in    **07**
hashing.

<div align="center"><b>OR</b></div>

**Q.4**  **(a)**  Explain indexed sequential file structure.    **03**

**(b)**  Explain minimal spanning tree.    **04**

**(c)**  What is hashing? What are the qualities of a good    **07**
hash function? Explain any two hash functions in
detail.

**Q.5**  **(a)**  Define topological sort?    **03**

**(b)**  Compare sequential searching with binary    **04**
searching in detail.

**(c)**  Examine the algorithm for Insertion sort and sort the    **07**
following array: 77, 33, 44, 11, 88, 22, 66, 55

<div align="center"><b>OR</b></div>

**Q.5**  **(a)**  What do you mean by internal and external sorting?    **03**

**(b)**  Write an algorithm for quick sort.    **04**

**(c)**  What is Binary Search Tree? Construct a binary    **07**
search tree for the following elements
21, 16, 24, 18, 22, 25, 26, 27, 29, 33